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Soils of the Gulf Islands of British Columbia

Volume 2 Soils of North Pender, South Pender, Prevost, Mayne, Saturna, and lesser islands

Report No. 43 British Columbia Soil Survey 1988

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Soils of the Gulf Islands of British Columbia

Volume 2 Soils of North Pender, South Pender Prevost, Mayne, Saturna, and lesser islands

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Report No. 43
British Columbia Soil Survey

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Land Resource Research Centre
Contribution No. 86-76

(Accompanying Map sheets from Soils of the Gulf Islands of British Columbia series:
· North Pender, South Pender, and Prevost islands
· Mayne and Saturna islands)

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Cover photo: Boot Cove, Saturna Island, looking towards Samuel Island.

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PREFACE

North and South Pender, Prevost, Mayne, Saturna, and lesser islands cover a total area of 10 280 ha in the Gulf Islands of British Columbia shown on map sheets 92B/11 and 92B/14 of the National Topographic Series. The aim of this report is to provide detailed soils information at a scale of 1:20 000 for local planning purposes, and to emphasize the soil limitations that are important to residential development and agriculture.

The two accompanying soil maps show the distribution and extent of the soil map units. The map legends identify each map unit by color and symbol. Each gives the proportion of dominant, subdominant, or minor soil components, the origin and texture of the parent materials, the soil depth, the soil drainage, and the landscape characteristics for each map unit. The report and map are complementary; therefore, it is necessary to use both to fully understand the soils. Two interim soil maps with extended legends have also been produced at a 1:20 000 scale and have been made available from the Map Library, Maps B.C., Ministry of Environment, Victoria, B.C.

Note: This publication is the second in a series of five volumes on Soils of the Gulf Islands of British Columbia, Report No. 43 of the British Columbia Soil Survey. The other publications are entitled:

Volume 1 Soils of Saltspring Island;
Volume 3 Soils of Galiano, Valdes, Thetis, Kuper, and lesser islands;
Volume 4 Soils of Gabriola Island and lesser islands; and
Volume 5 Soils of Sidney, James, Moresby, Portland, and lesser islands.

The correct citation is as follows:

Kenney, E.A.; Van Vliet, L.J.P.; Green, A.J. 1988. Soils of the Gulf Islands of British Columbia: Volume 2 Soils of North Pender, South Pender, Prevost, Mayne, Saturna, and lesser islands. Report No. 43, British Columbia Soil Survey. Research Branch, Agriculture Canada, Ottawa, Ont. 137 pp.

PART 1. INTRODUCTION

The first soil survey that included the Gulf Islands was completed in the late 1950s (Day et al. 1959). This survey at a scale of 1:63 360 (2.5 cm to 1.6 km) served a useful purpose for land planners and agriculturists over the years. During the Canada Land Inventory mapping program in the 1960s more soils information was obtained for the Gulf Islands to produce capability maps for agriculture and other uses (1:50 000). Since then, some of the Gulf Islands have been surveyed in more detail by different agencies in response to requests from the Islands Trust of the British Columbia Ministry of Municipal Affairs and Regional Districts. The soil maps have been used by planners to draft official community plans for the islands. However, no published soil survey reports accompanied these maps.

With increasing population pressures on the Gulf Islands (Barr 1978), the Islands Trust identified the need for more detailed resource information for land use planning. In 1978, the Islands Trust requested the Terrestrial Studies Section of the Surveys and Resource Mapping Branch, British Columbia Ministry of Environment, to undertake a comprehensive and detailed mapping program covering the Gulf Islands, from Newcastle Island opposite the city of Nanaimo to D'Arcy Island off Victoria, which are under the jurisdiction of the Islands Trust. It was decided to produce a biophysical data base by means of resource folios for each of the southern Gulf Islands at a scale of 1:20 000. The soil inventory part of these folios became the responsibility of the British Columbia Soil Survey Unit, Agriculture Canada, Vancouver, B.C., under a program called the Gulf Islands soil survey. In addition to the islands under the jurisdiction of the Islands Trust, this soil survey program included all other southern Gulf Islands from Nanaimo to Victoria.

The objectives of the Gulf Islands soil survey are as follows:

- to produce an updated soil inventory for all of the southern Gulf Islands at a scale of 1:20 000, using the latest techniques for soil survey, data handling, and map production;
- to produce interpretive soil ratings and maps for the Islands Trust and for other users; and
- to publish the soil maps and soil survey reports for each island or group of islands.

Fieldwork for the Gulf Islands soil survey commenced during the summer of 1979, with the soil inventory for Galiano, Valdes, and Thetis islands. Interim soil maps and legends as part of the resource folios for these islands were published by the Resource Analysis Branch, British Columbia Ministry of Environment, as follows: the Galiano Island map sheet by Green (1979), the Thetis Island map sheet by Van Vliet and Brierley (1979a), and the Valdes Island map sheet by Van Vliet and Brierley (1979b).

Fieldwork for the soil inventory for Saltspring Island was completed during the summer of 1981. The interim soil maps (north and south sheets) with an extended legend were published as part of the resource folio for Saltspring Island (Van Vliet et al. 1983). The final report and soil map were published as Soils of the Gulf Islands of British Columbia Volume 1 Soils of Saltspring Island (Van Vliet et al. 1987).

Fieldwork for the soil inventory for North and South Pender, Prevost, Mayne, Saturna, and lesser islands took place during the summers of 1982 and 1983. Interim soil maps with extended legends were published on two map sheets during the following year (Van Vliet et al. 1984; Kenney and Van Vliet 1984).

PART 2. GENERAL DESCRIPTION OF THE AREA

Location and extent

North and South Pender, Prevost, Mayne, and Saturna, plus several lesser islands (Samuel, Tumbo, Curlew, Georgeson, Lizard, and Cabbage islands) are located in the Strait of Georgia between mainland British Columbia and Vancouver Island (Fig. 1). The area extends from latitude 48°43' to 48°52' N and from longitude 123°2' to 123°24' W and is covered by the map sheets 92B/11 and 92B/14 of the National Topographic Series.

Of the islands in this group, Saturna Island is the largest with an area of 3125 ha. The two Pender islands together encompass 3660 ha, with North Pender Island being the larger with 2730 ha. Mayne Island occupies 2340 ha and Prevost Island 685 ha. The lesser islands range in size from rock islets of less than 1 ha to Samuel Island with 190 ha (Ovanin, T.K. Personal communication, Islands Trust, Victoria, 1985).

History and development

A few of the island place names originate from the Spanish explorations of 1790-1792. The majority of the waters and island place names were assigned by the British surveyor, Captain Richards, during 1858-1859. He named places after his ship and crew, after the naval ships and crew in service on the coast at that time, and also after the ships and crew of earlier Spanish explorers. A history of Gulf Island place names is given by Akrigg and Akrigg (1973) and Obee (1981).

Population

The Gulf Islands were used seasonally as a fishing and a shellfish gathering base by the Coast Salish Indians (Duff 1961), although Borden (1968) suggested that during the period 1000-100 B.C. the Indians had their main centers on the Gulf Islands and visited the Fraser Valley seasonally. An Indian midden on Mayne Island has been dated at 3000-1000 B.C. (Carlson 1970), and an Indian midden on Pender Island has been dated at 250 ± 120 B.C. (Mitchell 1971).

The first recorded land purchase by a European was in 1855 for land on Pender Island, although the owner did not live on the property (Eis and Craigdallie 1980; Freeman 1961). The first recorded settler arrived on Mayne Island in 1863 (Creasy 1971). The other islands were settled shortly thereafter, and the population grew slowly. By 1886 the voters' list listed 16 men for Mayne Island, 7 for the Pender islands, 2 for Saturna Island, and 1 each for Tumbo and Prevost islands (British Columbia Historical Association 1961). The 1981 census indicated a permanent population of 229 people for Saturna Island, 546 for Mayne Island, and 1013 for the Pender islands (Ovanin, T.K. Personal communication, Islands Trust, Victoria, 1985).

These islands are in demand for weekend recreation (Plate I b and c), retirement, and summer cottages. During the summer months the population of these islands may triple (Eis and Craigdallie 1980).

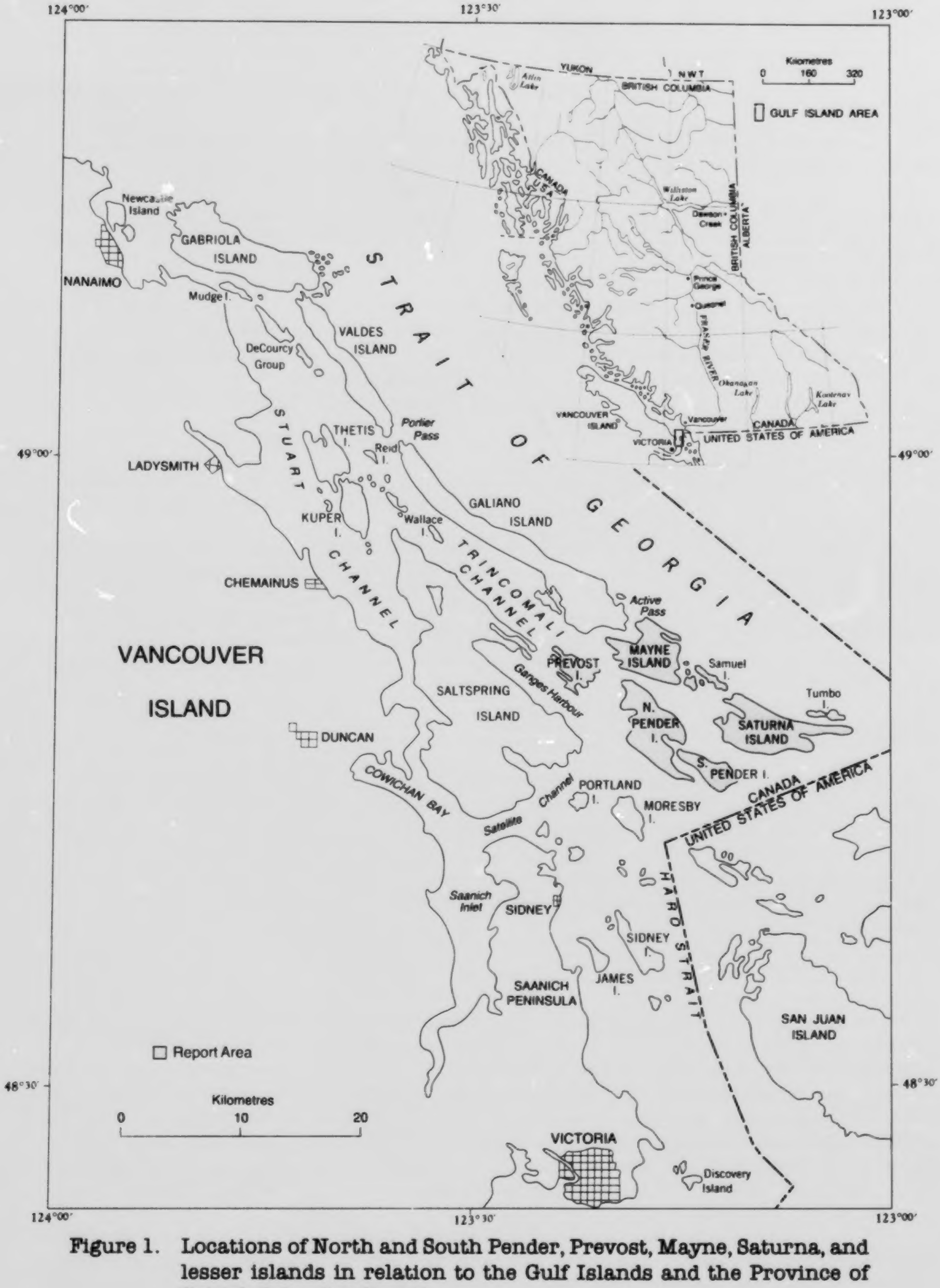
124°00'
123°30'
123°00'
49°00'
48°30'
YUKON
N.W.T.
BRITISH COLUMBIA
Atlin Lake
Kilometres
0
160
320
GULF ISLAND AREA
CANADA
U.S.A.
Williston Lake
Dawson Creek
BRITISH COLUMBIA
ALBERTA
Prince George
Quesnel
FRASER RIVER
Okanagan Lake
Kootenay Lake
VANCOUVER ISLAND
Vancouver
VICTORIA
CANADA
UNITED STATES OF AMERICA
Newcastle Island
NANAIMO
GABRIOLA ISLAND
Mudge I.
DeCourcy Group
VALDES ISLAND
STRAIT OF GEORGIA
STUART CHANNEL
THETIS I.
Porlier Pass
Reid I.
LADYSMITH
KUPER I.
Wallace I.
GALIANO ISLAND
TRINCOMALI CHANNEL
CHEMAINUS
Active Pass
VANCOUVER ISLAND
PREVOST I.
MAYNE ISLAND
Samuel I.
Ganges Harbour
SALTSPRING ISLAND
Tumbo I.
N. PENDER I.
SATURNA ISLAND
DUNCAN
S. PENDER I.
COWICHAN BAY
Satellite Channel
PORTLAND I.
MORESBY I.
CANADA
UNITED STATES OF AMERICA
HARO STRAIT
Saanich Inlet
SIDNEY
SIDNEY I.
JAMES I.
SAANICH PENINSULA
SAN JUAN ISLAND
Report Area
Kilometres
0
10
20
VICTORIA
Discovery Island

Figure 1. Locations of North and South Pender, Prevost, Mayne, Saturna, and lesser islands in relation to the Gulf Islands and the Province of British Columbia (inset).

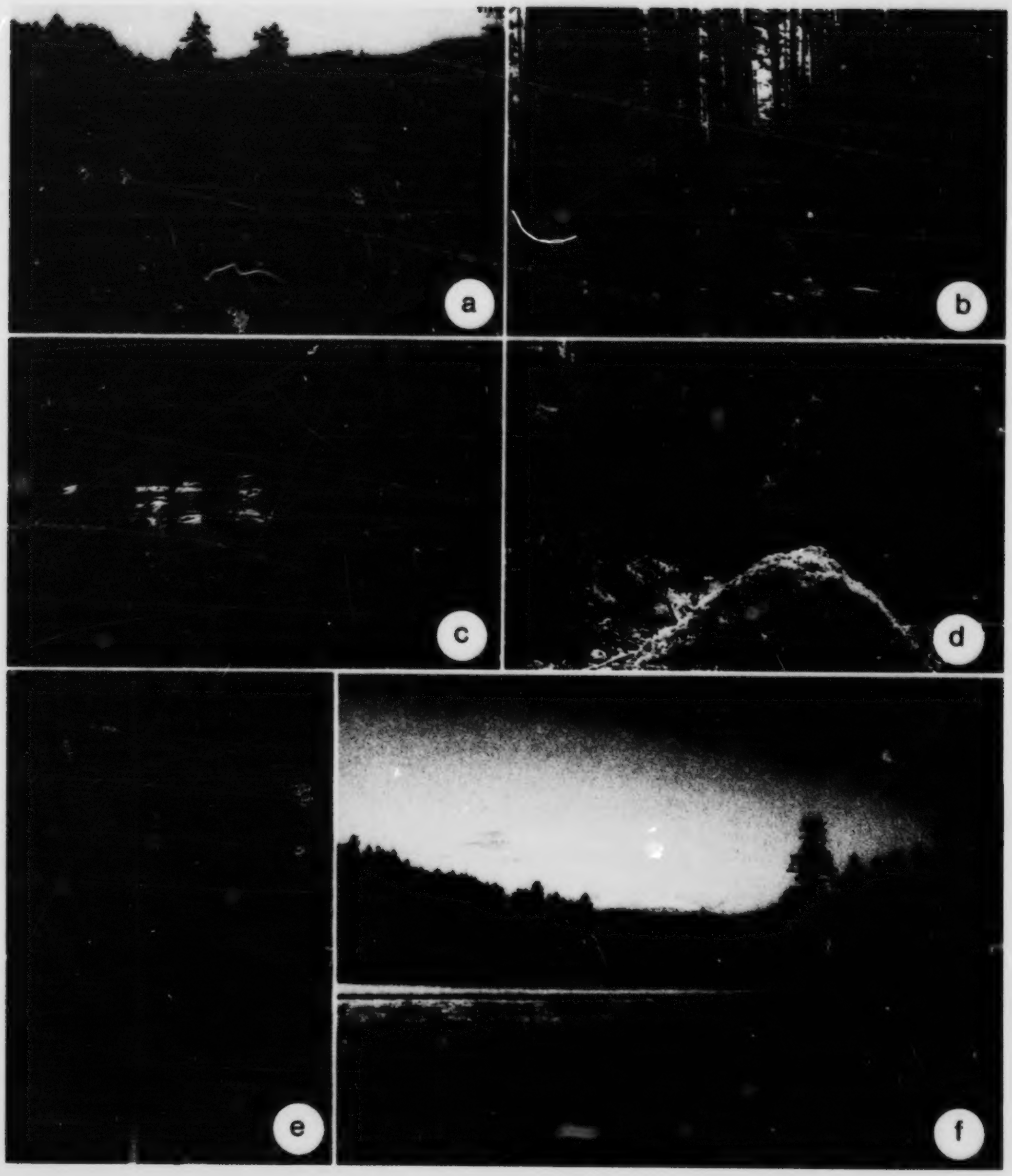

Plate I

(a) Pasture on Mayne Island on deep Parksville and Tolmie soils (photo courtesy Province of British Columbia).

(b) Second-growth coast Douglas fir on Saturna soils in the ecological reserve on Saturna Island.

(c) Mount Warburton Pike Peak, Saturna Island; open grassy area dominated by Rock and very shallow Bellhouse soils on steep slopes.

(d) Typical landscape dominated by Rock and very shallow Saturna soils on bedrock knolls and ridges.

(e) Profile of shallow Saturna soil (Orthic Dystric Brunisol) overlying sandstone bedrock.

(f) Pasture on Prevost Island; in foreground, deep Tolmie and Parksville soils with Brigantine soils on side slope; in background, tree-covered bedrock ridges.

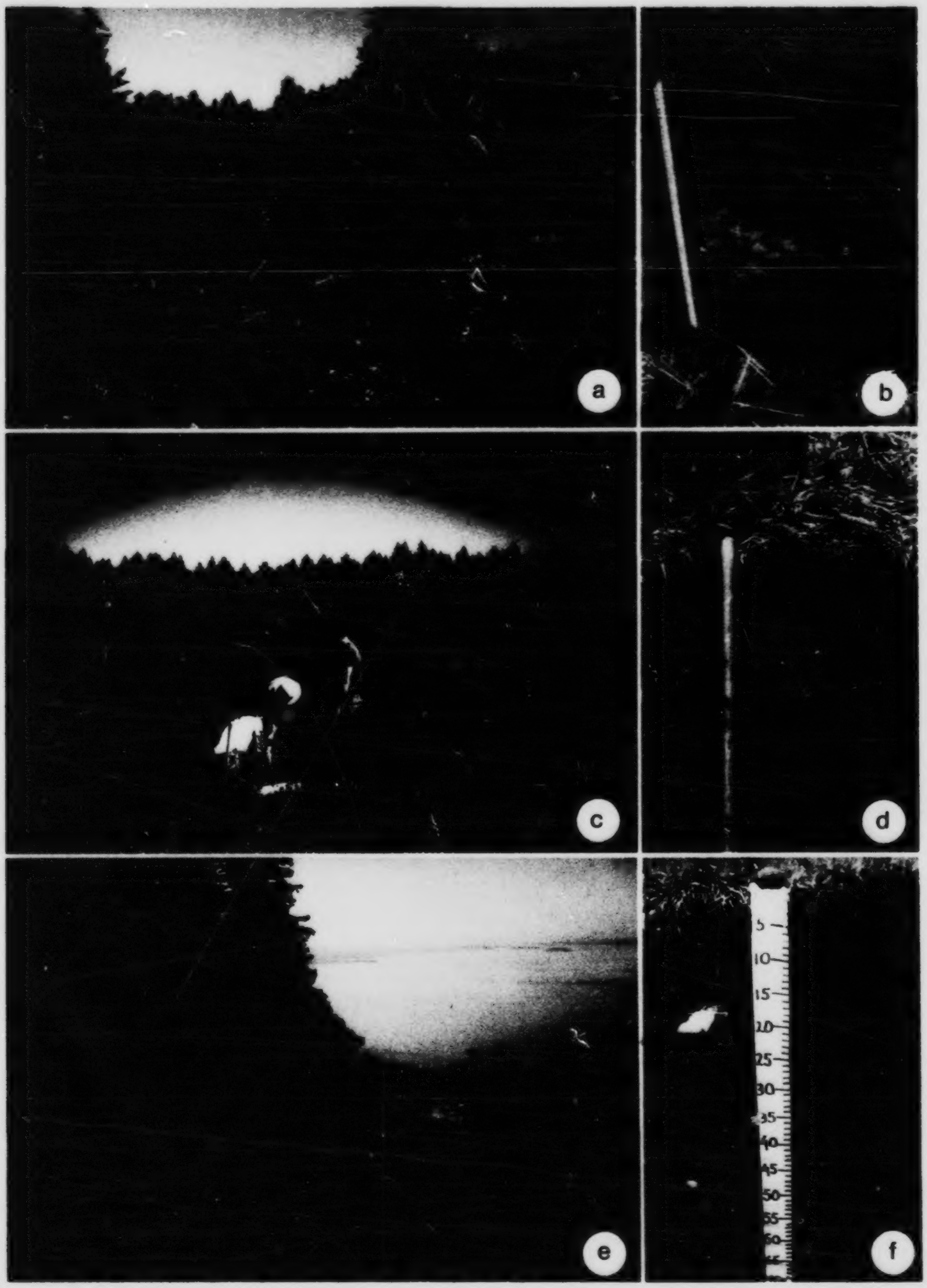

Plate II

(a) Narrow drainageway with Tolmie soils in between bedrock ridges on Prevost Island.
(b) Tolmie soil profile (Orthic Humic Gleysol) developed on deep, silty clay loam, marine sediments.
(c) Metchosin soil landscape; vegetation is dominantly hardhack (*Spiraea douglasii*).
(d) Metchosin soil profile (Typic Humisol) on deep, well-decomposed peat deposits.
(e) Bellhouse soil landscape; vegetation is dominantly grass on steep, south-facing slopes.
(f) Bellhouse soil profile (Orthic Sombric Brunisol) overlying sandstone bedrock.

The economic base of the islands is centered around farming (Plate I a and f), fishing, logging, tourism, retirement living, and the services these require (Islands Trust 1982).

Land use

The nonaboriginal settlers and the subsequent early population were principally homesteaders and farmers who, in addition to supplying local needs, sold their products to markets on Vancouver Island and the mainland. Mayne Island is credited with being the first place in British Columbia to grow apples (Foster 1961) and one of the first places in British Columbia to grow hothouse tomatoes (Rainsford 1971). Sheep and lamb, beef and dairy cattle, poultry, and hay (Plate I f) are the main agricultural commodities along with small amounts of potatoes, fruit, and vegetables all produced primarily for the local market (British Columbia Ministry of Agriculture 1978). Of an agricultural land reserve of about 2000 ha, 378 ha are on Mayne Island, 326 ha are on North Pender Island, 80 ha are on Prevost Island, 1028 ha are on Saturna Island, and 190 ha are on South Pender Island (Islands Trust 1978).

Second-growth timber provides a basis for a logging industry run by small operators on private land. The commercial tree species are coast Douglas fir (*Pseudotsuga menziesii* var. *menziesii*), western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and grand fir (*Abies grandis*) (Islands Trust 1982). Spelling of all botanical names is according to Taylor and MacBryde (1977).

Most of the land on these islands is privately owned and many of the lesser islands are wholly privately owned. The main exception is Cabbage Island, which is a provincial marine park. North Pender, South Pender, and Saturna islands each have one provincial park (British Columbia Ministry of Lands, Parks, and Housing 1981). Saturna Island also has an ecological reserve (British Columbia Ministry of Lands, Parks, and Housing 1981). In addition, there is Crown land on Mayne, Saturna, and Pender islands; an Indian reserve on Mayne, Saturna, and South Pender islands; and land in the agriculture land reserve on each of Mayne, Saturna, Pender, Prevost, Samuel, and Tumbo islands (Figs. 2-5; Islands Trust 1978, 1982).

Increasing population has resulted in a high demand for residential land over the past several years. Official community plans for Pender, Saturna, and Mayne islands specify the different land use categories and regulate development in accordance with agreed upon goals and policies (Islands Trust 1982).

Transportation and energy

The provincial government operates ferries with regular sailings to North Pender, Mayne, and Saturna islands from the Mainland and Vancouver Island. There are approximately 45 km of main paved roads on the Pender islands. In 1955, North and South Pender islands were joined by a bridge spanning the canal excavated in 1903 between the two islands. Mayne Island has approximately 30 km of main roads and Saturna Island has approximately 35 km of main roads (Obee 1981). Electricity is brought in from the mainland.

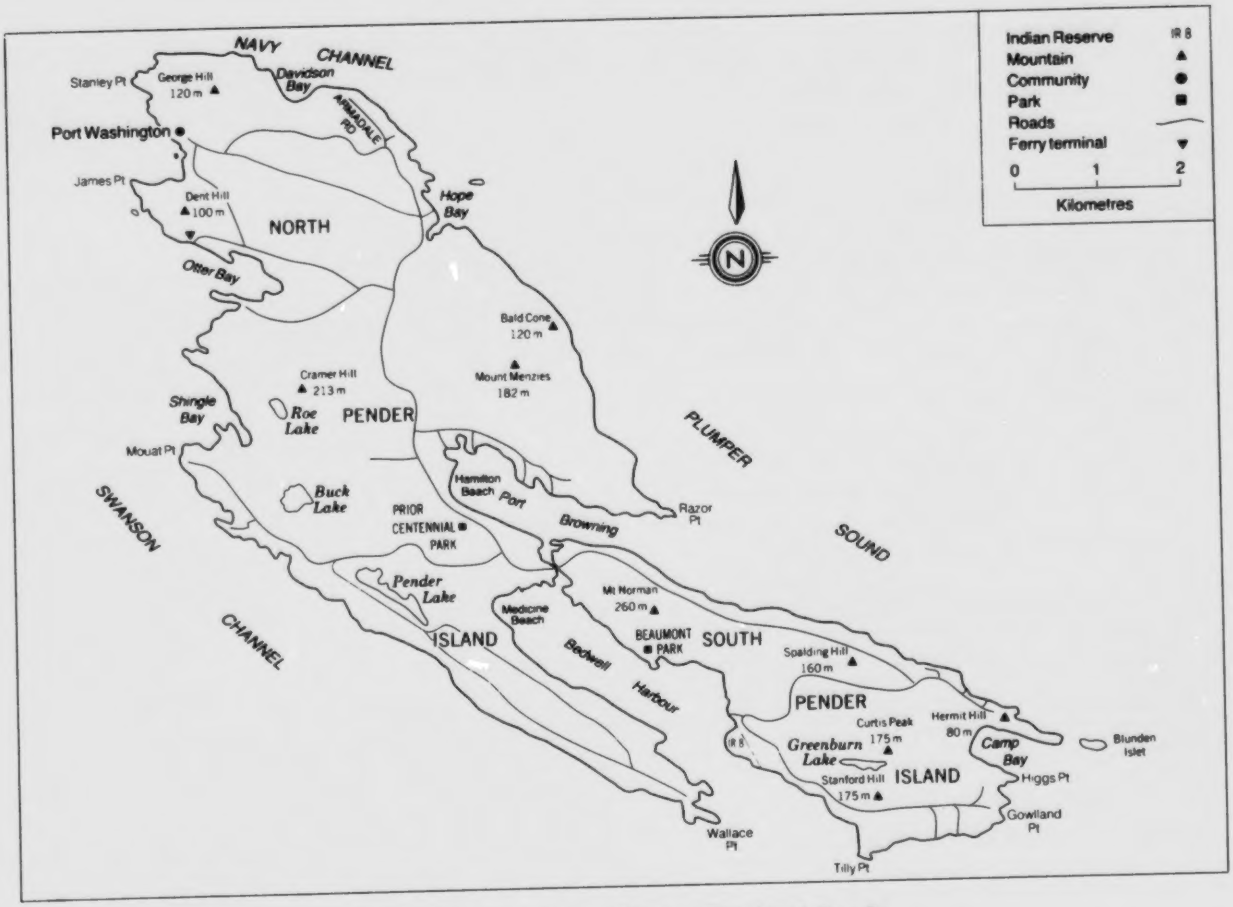
NAVY CHANNEL
Stanley Pt
George Hill 120 m
Davidson Bay
ARMADALE RD
Port Washington
James Pt
Dent Hill 100 m
NORTH
Hope Bay
Otter Bay
Bald Cone 120 m
Mount Menzies 182 m
Cramer Hill 213 m
Shingle Bay
Roe Lake
PENDER
Mouat Pt
PLUMPER
SWANSON
Buck Lake
Hamilton Beach
Port
Browning
Razor Pt
PRIOR CENTENNIAL PARK
SOUND
Pender Lake
Mt Norman 260 m
Medicine Beach
CHANNEL
ISLAND
Bedwell
BEAUMONT PARK
SOUTH
Spalding Hill 160 m
Harbour
PENDER
Curtis Peak 175 m
Hermit Hill 80 m
IR 8
Greenburn Lake
Camp Bay
Blunden Islet
Stanford Hill 175 m
ISLAND
Higgs Pt
Gowlland Pt
Wallace Pt
Tilly Pt
Indian Reserve IR 8
Mountain ▲
Community ●
Park ■
Roads
Ferry terminal ▼
0 1 2
Kilometres
N

Figure 2. North and South Pender islands

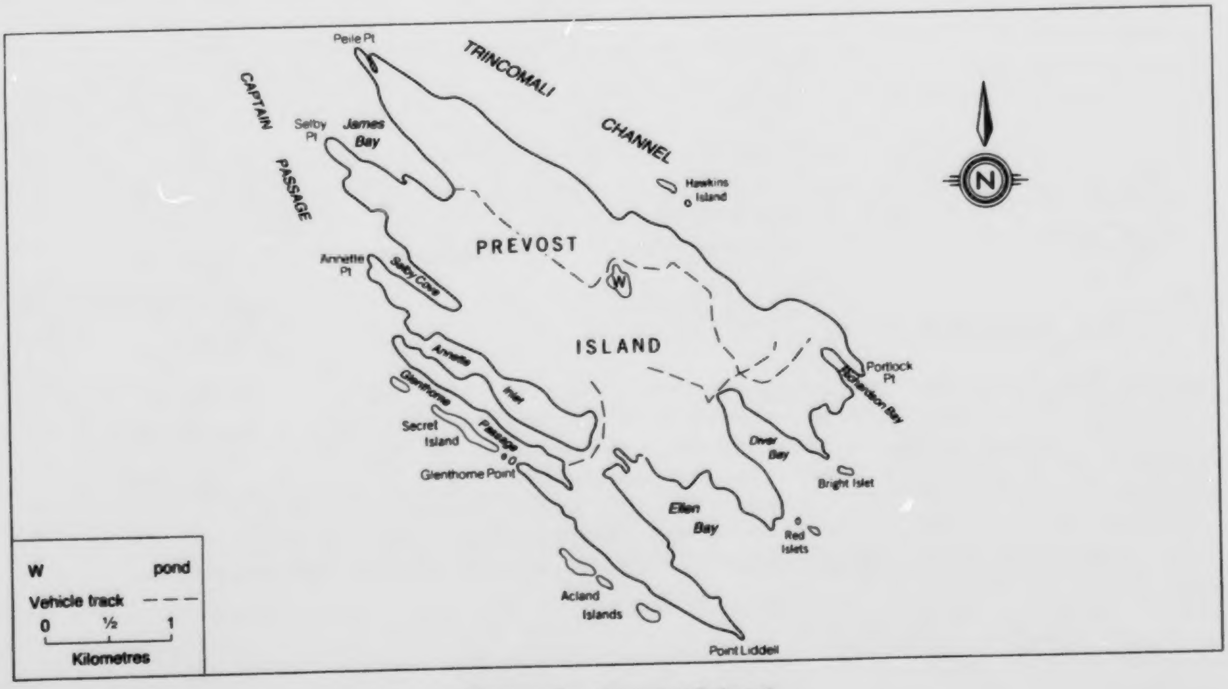
Peile Pt
TRINCOMALI
CAPTAIN
Selby Pt
James Bay
CHANNEL
PASSAGE
Hawkins Island
N
PREVOST
Annette Pt
Selby Cove
W
ISLAND
Annette
Inlet
Portlock Pt
Richardson Bay
Glenthorne
Secret Island
Passage
Glenthorne Point
Diver Bay
Bright Islet
Ellen Bay
Red Islets
W pond
Vehicle track
0 ½ 1
Kilometres
Acland Islands
Point Liddell

Figure 3. Prevost Island

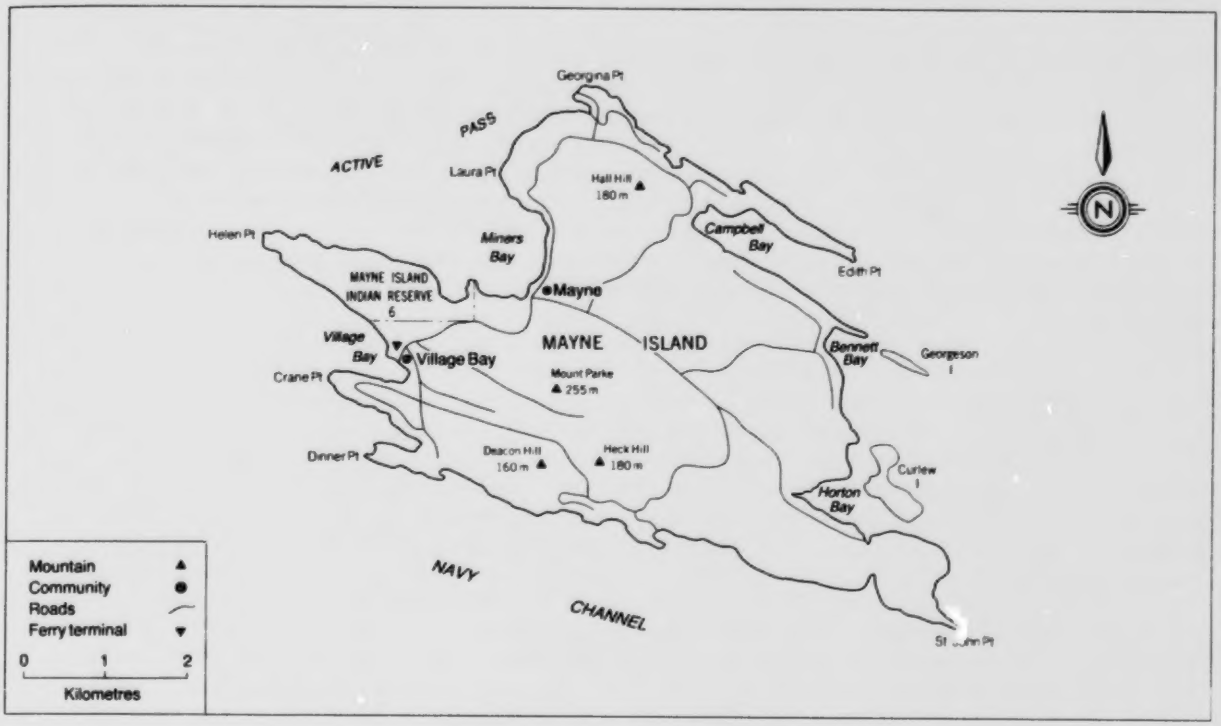
Georgina Pt
ACTIVE
PASS
Laura Pt
Hall Hill
180 m
Helen Pt
Miners
Bay
Campbell
Bay
Edith Pt
MAYNE ISLAND
INDIAN RESERVE
6
Mayne
MAYNE
ISLAND
Village
Bay
Village Bay
Bennett
Bay
Georgeson
I
Crane Pt
Mount Parke
255 m
Dinner Pt
Deacon Hill
160 m
Heck Hill
180 m
Curlew
I
Horton
Bay
NAVY
CHANNEL
St John Pt
Mountain ▲
Community ●
Roads
Ferry terminal ▼
0
1
2
Kilometres

Figure 4. Mayne Island

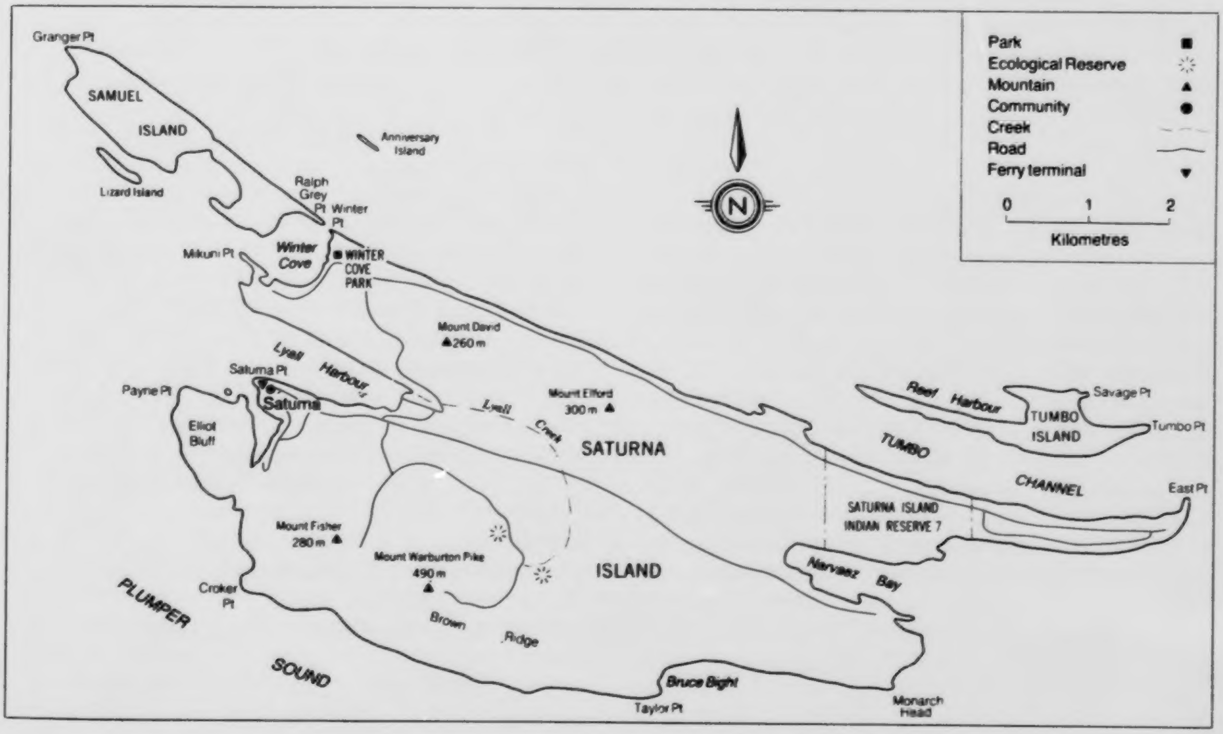
Granger Pt
SAMUEL
ISLAND
Anniversary
Island
Lizard Island
Ralph
Grey
Pt
Winter
Pt
Mikuni Pt
Winter
Cove
WINTER
COVE
PARK
Mount David
260 m
Lyall
Harbour
Saturna Pt
Payne Pt
Saturna
Elliot
Bluff
Lyall
Creek
Mount Elford
300 m
SATURNA
Reef
Harbour
TUMBO
ISLAND
Savage Pt
Tumbo Pt
TUMBO
CHANNEL
East Pt
SATURNA ISLAND
INDIAN RESERVE 7
Mount Fisher
280 m
Mount Warburton Pike
490 m
ISLAND
Narvaez
Bay
Croker
Pt
PLUMPER
SOUND
Brown
Ridge
Bruce Bight
Taylor Pt
Monarch
Head
Park ■
Ecological Reserve
Mountain ▲
Community ●
Creek
Road
Ferry terminal ▼
0
1
2
Kilometres

Figure 5. Saturna Island

Water supplies and drainage

Freshwater supplies on the islands are limited. Water supply is primarily from wells as there are only a few short intermittent streams and very few lakes. The limited groundwater storage is found in the faults and fractures in the bedrock and at contact zones between shale and sandstone bedrock (Foweraker 1974; Mordaunt 1981; Hodge 1985). During the summer months when the demand for water is highest, shortages may occur as sources of surface water dry up and the recharge of groundwater storage is at is lowest. All recharge to potable groundwater comes from precipitation, which falls during the late fall and winter months (Foweraker 1974).

Water quality in some areas of these islands may also be a problem, either as a result of saltwater intrusion or from contamination by domestic or agricultural wastes (Islands Trust 1982, 1984). Studies of groundwater quantity and quality have been done for Mayne, Saturna, and North Pender islands. Hodge (1985) reported 517 wells on the Pender islands, 341 wells on Mayne Island, and 100 wells on Saturna Island. The average depth of drilled wells on Saturna Island is 66 m.

The Lyall Harbour - Boot Cove area of Saturna Island is serviced by a surface water system that collects runoff from the surrounding steeper terrain in an artificial lake of about 2.5 ha. Groundwater demand on Saturna Island is not exceeding its supply (Hodge 1985). Water quality on this island is good for most areas. Saltwater intrusion may be a problem in the East Point peninsula where a limited catchment area supplies a large number of wells.

For Mayne Island, Foweraker (1974) indicated that groundwater was sufficient to supply demand with the possible exception of the Bennett Bay area. Heisterman (1974) reported that most areas had good-quality groundwater with one major exception. Poor-quality water, high in sodium, chloride, and sulfate ions, is associated with a fault running roughly from David Cove south to Gallagher Bay, and also in the low, interior basin area east of the fault. Localized areas of saltwater intrusion in the coastal regions are likely caused by overpumping or by drilling coastal wells too deep. There are no lakes on Mayne Island.

Mordaunt (1981) reported that ground and surface waters on North Pender Island are lacking both in quantity and quality. This island has 12 springs, 246 drilled wells, 78 dug wells, several small ponds, and three lakes. The average depth of the wells is 52.7 m. In the groundwater regions of Port Washington, Colston Cove, and south-east of Pender Lake, demand for water exceeds supply and shallow wells often run dry during the summer. Lakes Pender (16.2 ha), Buck (10.5 ha), and Roe (3.6 ha) provide a community water-supply system to service the Magic Lake Estates subdivision. They drain via intermittent creeks into the ocean. Both Pender and Buck lakes are artificial impoundments created by damming the outlet of swamps. Water quality in these lakes is deteriorating as a result of eutrophication. In addition, residential development surrounding Pender Lake is contributing to water quality deterioration. Saltwater intrusion is occurring in the Colston Cove region (Mordaunt 1981).

Not much information about water quantity and quality is available for South Pender Island, probably because of the low population pressure. South Pender Island has 107 permanent residents (Ovanin, T.K. Personal communication, Islands Trust, Victoria, 1985). The only lake, Greenburn Lake (6 ha), has also been dammed to supply water to Bedwell Harbour marina and drains into Egeria Bay.

Climate

The climate of the southern Gulf Islands has been well described by Kerr (1951), Chilton (1975), and Coligado (1979). The climate is strongly influenced by rain shadow effects of the Olympic Mountains to the south in Washington and of the "Insular Mountains" of Vancouver Island to the west (Holland 1976) and is moderated by the ocean. Kerr (1951) referred to the climate of the Gulf Islands as a "Transitional Cool Mediterranean Climate." The climate is characterized by cool, dry summers and humid, mild winters. January mean temperatures generally range from 2.9°C to 3.8°C with mean minimum temperature of just below freezing (Table 1). Most of the mean annual precipitation (80-85%) occurs during the months of October to April. Mean temperatures in July generally range between locations from 16.3°C to 17.3°C with a mean maximum of 22-24°C. Less than 5% of the mean annual precipitation falls during July and August. Also, during May-September the southern Gulf Islands are considered to be one of the sunniest places in Canada with 1300-1400 h of bright sunshine. These summer climatic conditions result both in soil moisture deficits for crop production, particularly on coarse-textured soils, and in a high hazard for forest fires.

Some of the more important climatic data pertaining to the southern Gulf Islands are summarized in Table 1. Specific long-term climatic data for North and South Pender and Mayne islands are presented in Table 2 and Figs. 6 and 7.

Natural vegetation

The Gulf Islands occur in the drier Maritime subzone of the coastal Douglas fir (CDF) biogeoclimatic zone (Krajina 1969) and the Georgia Strait section of the Coast Forest region of Rowe's (1977) classification. The CDF zone ranges in elevation from sea level to 450 m in the southern portion, including southern Gulf Islands, and to 150 m in the northern portion (Klinka et al. 1979). The characteristic tree species of the CDF zone and, therefore, of Mayne, Saturna, Prevost, North and South Pender islands is coast Douglas fir. Within the drier subzone, on drier, open sites where the soils are shallow over bedrock, Garry oak (*Quercus garryana*) and Pacific madrone (*Arbutus menziesii*) occur. Garry oak usually grows in pure stands but is limited in occurrence. Pacific madrone occurs more frequently than Garry oak, often in association with coast Douglas fir. Other coniferous tree species that occur are grand fir, western red cedar, shore pine (*Pinus contorta*), Sitka spruce (*Picea sitchensis*), and western hemlock. The deciduous trees occurring on North and South Pender, Prevost, Saturna, and Mayne islands are red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*),black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), western flowering dogwood (*Cornus nuttallii*), and bitter cherry (*Prunus emarginata*).

Table 1. Summary of climatic data for the southern Gulf Islands

Temperature	
January mean temperature	3.4°C
January mean minimum temperature	-0.5°C
Extreme low winter temperature	-16°C (Vesuvius, November 1920)
July mean temperature	16.8°C
July mean maximum temperature	23.0°C
Extreme high summer temperature	38°C (Ganges, July 1966)
Precipitation	
Average annual rainfall*	807 mm (715-990 mm)
Average annual snowfall*	35 cm (21-75 cm)
July and August (driest months)	<5% of annual precipitation
November-January (wettest months)	almost 50% of annual precipitation
October-April	80-85% of annual precipitation
Miscellaneous	
Freeze-free period	>200 days (longest growing season in Canada)
Hours with bright sunshine	
May-September	1300-1400
Annual	>1900
Fog occurrence average	30 days of the year (mainly September-February)
Windiest period	November-January
Least windy period	May-September

Source: after Coligado (1979).
* after Atmospheric Environment Service (1982).

Table 2. Mean temperatures and precipitation for Mayne and North and South Pender islands

Climatic parameter	Mayne Island	North Pender Island	South Pender Island
Temperature (°C)			
January mean minimum	-	-	0.7
July mean maximum	-	-	21.9
Annual mean temperature	-	-	9.9
Lowest minimum recorded	-	-	9.4
Highest maximum recorded	-	-	32.2
Precipitation			
Rainfall:			
Annual (mm)	787	791	758
May-September (mm)	156	141	162
Extreme 24 h (mm)	72	77	55
No. of days with rain	139	115	155
Snowfall:			
Annual (cm)	30.0	25	23
Extreme 24 h (cm)	16.5	41	29
No. of days with snow	7	4	6

Source: after Atmospheric Environment Service (1982).

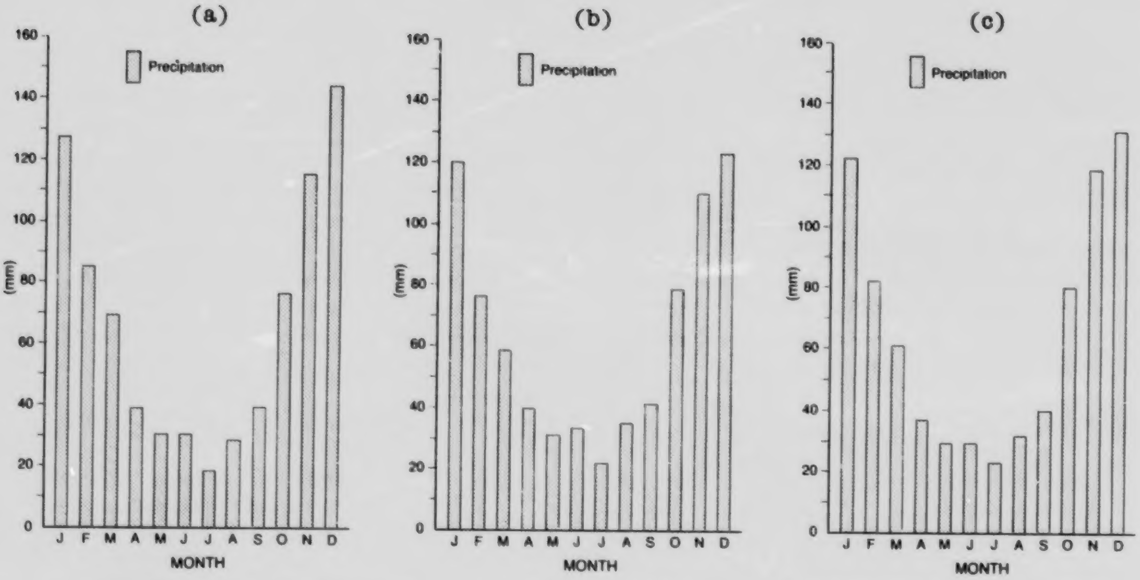

Figure 6. Mean monthly precipitation: for (a) North Pender, (b) South Pender, and (c) Mayne islands (after Atmospheric Environment Service 1982)

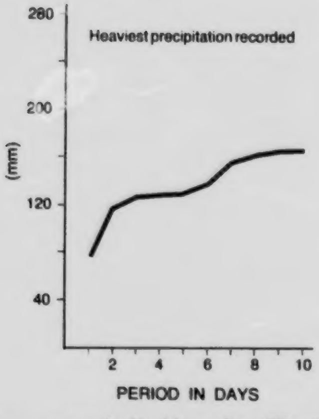

Figure 7. Extreme precipitation for North Pender Island 1941-1965 (after Coligado 1979)

The shrub layer is dominated by salal (*Gaultheria shallon*) and, to a lesser extent, by dull Oregon-grape (*Mahonia nervosa*), red huckleberry (*Vaccinium parvifolium*), and evergreen huckleberry (*Vaccinium ovatum*). Salmonberry (*Rubus spectabilis*) is common in moist areas. Herbs and mosses have a low presence, although a variety of ferns commonly occurs along with northern twinflower (*Linnaea borealis*), American vanilla leaf (*Achlys triphylla*). Many species of spring flowers occur, especially in pockets of shallow soils on bedrock outcrops. The Gulf Islands flora is likely one of the most varied in British Columbia (Krajina 1969; Lyons 1976; Klinka et al. 1979; Eis and Craigdallie 1980).

Species such as fireweed (*Epilobium angustifolium*), common gorse (*Ulex europaeus*), Scotch broom (*Cytisus scoparius*), American stinging nettle (*Urtica dioica* ssp. *gracilis*), western fescue (*Festuca occidentalis*), and orchard grass (*Dactylis glomerata*) occur on disturbed sites (Hirvonen et al. 1974). The vegetation of these southeasterly Gulf Islands, like that of other Gulf Islands, have been disturbed extensively by logging and fire (Eis and Craigdallie 1980).

In 1971, 131 ha of a coast Douglas fir forest on Saturna Island were set aside as an ecological reserve (Ecological Reserves Unit 1981). Almost all the reserve is covered with coast Douglas fir and a dense understory of salal.

Eis and Craigdaillie (1980) included the vegetation as a component of the landscape units they described for the Gulf Islands. Detailed community descriptions and species lists for the vascular plants have been done for Saturna Island (Janszen 1977) and Mayne Island (Janszen 1981).

Geology

The islands in the report area are underlain by sedimentary formations of Upper Cretaceous age belonging to the Nanaimo Group. The Nanaimo Group is a conformable sequence of marine and nonmarine sediments for which five major depositional periods have been recognized (Muller 1977). These cycles show "a gradation from deltaic sandstones and/or conglomerates through marine rhythmic beds of siltstone, sandstone, and shale either into pure shale and mudstone or interbedded units richer in shale and mudstone" (Winsby 1973). These sequences are considered to be a series of transgressive cycles. Each cycle shows a progression from fluvial to deltaic and/or lagoonal to nearshore marine and offshore marine conditions (Muller and Jeletzky 1970).

The Nanaimo Group is the only bedrock group to occur on North and South Pender, Mayne, Saturna, and Prevost islands and consists of the following sedimentary bedrock types: sandstone, shale, siltstone, conglomerate, and, very rarely, coal. The older, underlying formations representing the Triassic-Jurassic metamorphic and volcanics and the Jura-Cretaceous batholithic rocks outcrop only on south Saltspring, Portland, Moresby, Sidney, and D'Arcy islands (Williams and Pillsbury 1958; Muller 1977).

Differential erosion of the bedrock by wave action has produced some interesting features. Concretions up to 1 m across are richer in carbonate and more resistant than the surrounding rock. Carbonate-filled networks of cracks also weather out to produce a "honeycomb" surface relief. Wave-cut "galleries" formed by undercutting of the sandstone at the high tidemark also occur. A "strongly ribbed" appearance is produced by differential erosion from wave action on thin bands of interbedded sandstone and shale (Muller and Jeletzky 1970).

The sedimentary bedrock strata dip gently towards the northeast. They dip steeply only in narrow fault zones (Muller and Jeletzky 1970). A broad fault zone characterized by steeply northeast-to-southwest dipping, overturned beds occurs on Prevost, Mayne, North and South Pender, and Saturna islands. An asymmetrical syncline with a steep southwest limb occurs on Prevost, Mayne, and Saturna islands (Muller and Jeletzky 1970). The major fault on North Pender Island is also a syncline. A major WNW-striking fault zone formed by five major faults is characterized by steeply dipping strata on North Pender Island (Mordaunt 1981). Folds are associated with longitudinal and crossfaulting on these islands (Muller and Jeletzky 1970; Mordaunt 1981). The Trincomali anticline is the most outstanding structural feature of the southern Gulf Islands. Cliffs along this anticline dip seaward (Williams and Pillsbury 1958).

Physiography

North and South Pender, Prevost, Mayne, Saturna, and the lesser islands are situated in the Nanaimo Lowland subdivision of the Georgia Depression physiographic unit of British Columbia (Holland 1976). Differential erosion of the Nanaimo Group bedrock has resulted in the dominant landform pattern of the Nanaimo Lowland, which is characterized by ridges or hills with steep descents on one side and a gentle slope on the other side. These ridges are separated by narrow valleys. The ridges are capped by more resistant sandstones and conglomerates whereas the valleys have been eroded out of less resistant shales and mudstones, often along fault lines. The steep descents on the ridges face easterly or westerly depending on the dip of the rock formation. The relief was further modified by glacial erosion and deposition of a fairly thick mantle of glacial and glaciofluvial materials (Williams and Pillsbury 1958; Holland 1976).

The highest points on North Pender Island are Cramer Hill (213 m) and Mount Menzies (182 m) (Mordaunt 1981). Mount Norman (260 m) is the highest peak on South Pender Island. On Mayne Island, Mount Parke (255 m) is the highest peak and on Saturna Island, Mount Warburton Pike (490 m) is the highest peak (Obee 1981).

Soil parent materials

Soils of these southeasterly Gulf Islands have developed on many kinds of unconsolidated materials. Most of the soil parent materials were originally transported and deposited by glaciers, rivers, lakes, and the sea since the last glaciation. Only a few soils have developed on recent fluvial materials, shorelines, and organic deposits. On sloping topography, soils have developed on colluvial and glacial till deposits. Fig. 8 shows a generalized cross section of soil parent materials in relation to landscape position.

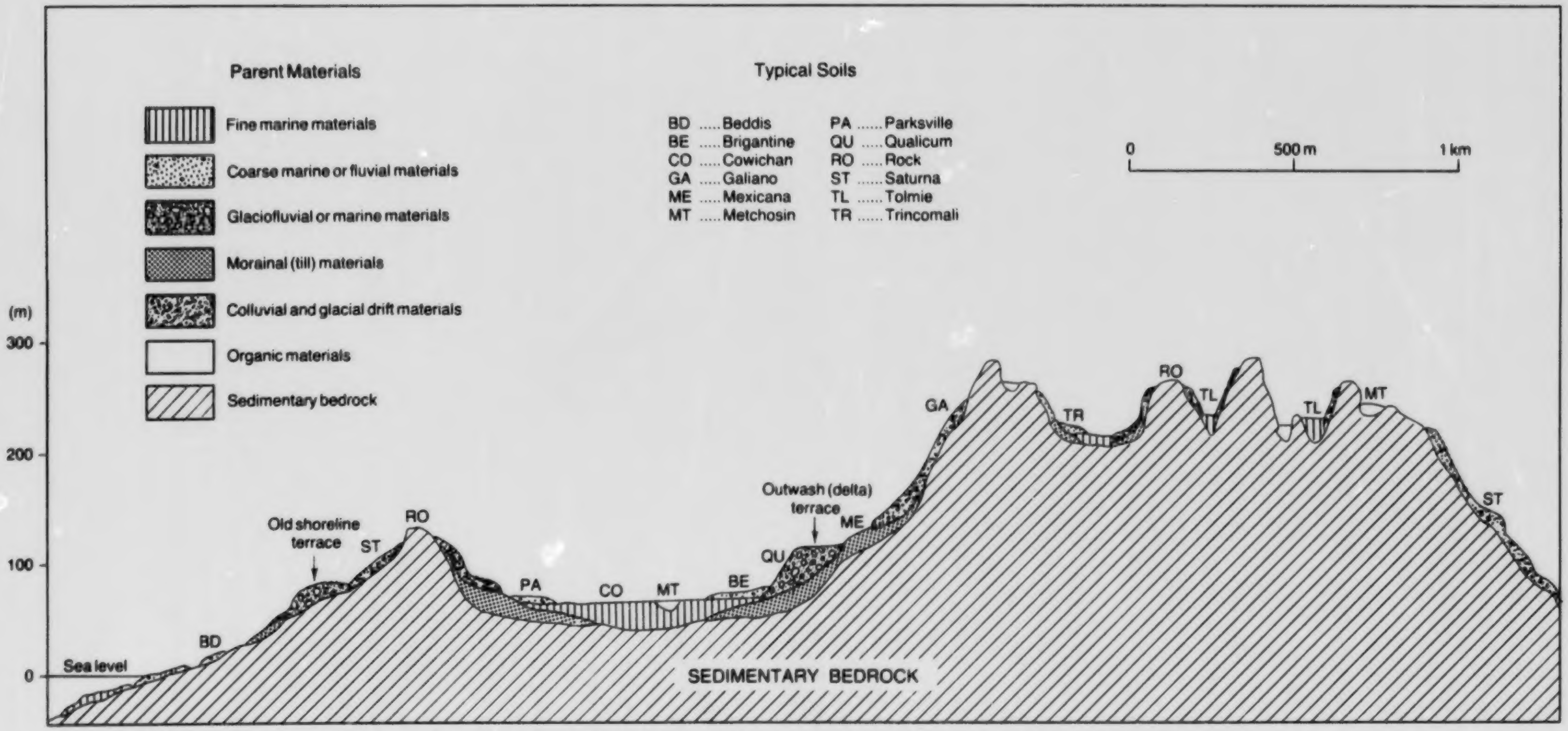
Parent Materials
Fine marine materials
Coarse marine or fluvial materials
Glaciofluvial or marine materials
Morainal (till) materials
Colluvial and glacial drift materials
Organic materials
Sedimentary bedrock
Typical Soils
BD ..... Beddis
BE ..... Brigantine
CO ..... Cowichan
GA ..... Galiano
ME ..... Mexicana
MT ..... Metchosin
PA ..... Parksville
QU ..... Qualicum
RO ..... Rock
ST ..... Saturna
TL ..... Tolmie
TR ..... Trincomali
0
500 m
1 km
(m)
300
200
100
0
Sea level
BD
Old shoreline terrace
ST
RO
PA
CO
MT
BE
QU
Outwash (delta) terrace
ME
GA
TR
RO
TL
TL
MT
ST
SEDIMENTARY BEDROCK

Figure 8. Generalized cross-section of soil parent materials and typical soils in relation to landscape position

All the Gulf Islands were glaciated several times during the Pleistocene. The last major ice sheet, which occurred during the Vashon stage of the Fraser Glaciation, reached the Gulf Islands some time less than 25 000 years ago and attained a climax about 15 000 years ago (Mathews et al. 1970). Depression of the land relative to the sea was caused by the weight of the glaciers (Clague 1975). During and after the retreat of the Vashon ice sheet, which was completed about 12 000 years ago (Mathews et al. 1970), the sea entered depressional areas and covered a large part of the present lowlands of the Gulf Islands, including North and South Pender, Mayne, Saturna, and Prevost islands (Halstead 1968). Since the retreat of the glaciers, the islands have risen gradually relative to the sea, so that now the highest marine deposits on the Gulf Islands are found at about 100 m above mean sea level. Deep, fine- to moderately fine-textured marine deposits accumulated in depressional areas and basins, well protected from wave action. These deposits form the parent materials of Cowichan, Tolmie, and Fairbridge soils. Similar deep, fine-textured materials occurring at elevations of over 100 m above mean sea level are said to be of lacustrine origin (Thomson, B. Personal communication, Surveys and Resource Mapping Branch, British Columbia Ministry of Environment, Victoria, 1980). When encountered, these lacustrine materials are so similar to the fine-textured marine materials that they were not mapped separately but were included with the soils developed on fine-textured marine parent materials. Deep, coarse- to moderately coarse-textured marine materials that were deposited in the sea or were modified by the sea became the parent materials of Baynes, Beddis, and Qualicum soils. They occur as shoreline deposits, bars, and terraces. Often they form shallow deposits over compact, glacial till (Trincomali soils) or over fine- to moderately fine-textured marine materials (Brigantine and Parksville soils) or over moderately fine-textured marine materials overlaying glacial till (St. Mary soils).

The thick mantle of till that was deposited during the last glaciation was subsequently eroded. In many upland areas, these till deposits have been eroded down to the underlying bedrock, except for small pockets on protected side slopes. Deeper till deposits occur in the lowland areas, but are often covered by shallow, coarse- and fine-textured marine deposits (Trincomali and St. Mary soils). Only one till was recognized on these islands. This material is a coarse- to moderately coarse-textured, stony (gravelly), compact till, which is the parent material of the Mexicana soil, most often occurring on mid- to lower-valley slopes.

During glacial retreat, meltwater streams deposited coarse-textured soils to form terraces or deltas. These glaciofluvial deposits form the parent materials of Baynes and Beddis soils (low in gravel content) and Qualicum soils (high in gravel content).

The soils that have developed on shallow colluvial and glacial drift materials over bedrock are Saturna and Bellhouse (over sandstone bedrock), Galiano (over shale and siltstone bedrock), Haslam complex (over sandstone, siltstone, and shale bedrock intermixed), Pender Island complex (over sandstone and conglomerate bedrock intermixed), and Salalakim (over conglomerate bedrock).

Recent fluvial (alluvial) deposits of medium texture are the parent materials of the Crofton soil. Organic deposits occur around small lakes and in closed depressions, where their origin is dominantly aquatic or sedimentary. The only Organic soil found on these islands consists of well-decomposed materials, which are the parent materials of the Metchosin soil. The only anthropogenic soil (Neptune) recognized consists of coarse-textured materials mixed with shells and organic debris (Indian middens). A summary of the soils grouped by parent materials is provided in the legend to the accompanying soil maps.

PART 3. SURVEY AND MAPPING PROCEDURES

How the soils were mapped

Before field mapping began, preliminary plotting of soil boundaries and areas assumed to have similar soils were marked on aerial photographs in the office. Boundaries between contrasting soils were mapped, using changes in visible landscape features and other indicators, such as slope, bedrock exposures and shallow soils, vegetation, landform (for example, terraces, ridge crests, and escarpments), peatlands containing Organic soils, and color tone indicating different drainage. Fieldwork involved checking these areas to determine the types of soils within them. Location of boundaries between contrasting soils were also checked either by visual examination or by digging and augering holes systematically on either side of them. They were then adjusted, if necessary, and finalized on the aerial photographs. Color aerial photographs at a scale of 1:20 000 were used for the field mapping of the islands during 1982 and 1983.

At each inspection or observation (a ground examination to identify or verify the soil) of a given area, soil properties were recorded. External features, such as site position, slope, aspect, elevation, stoniness, percentage bedrock exposed, and vegetation, were noted and recorded. Then properties, such as texture, drainage, depth to bedrock, root- and water-restricted layers, sequence of layers, and coarse fragment content, were recorded from soil pits, auger holes, or road cuts. The control section for both mineral and Organic soils was 160 cm. Consequently, when bedrock was absent, the depth to bedrock was recorded as 160 cm. When deep roadcuts were available for examination, properties occurring below 160 cm were recorded as notes. For data-recording purposes during mapping, soil layers, not soil horizons, were recognized. Soil layers are differentiated primarily on the basis of significant changes in textures that would affect interpretations (for example, sandy loam to clay loam, loamy sand to loam, loam to silty clay loam), or of changes in percentage of coarse fragment content (for example, 10% to 25%), or of size distribution of coarse fragments (for example, cobbles to gravels). Consequently, one soil layer may be made up of one or more genetic soil horizons (for example, layer one may include Ap and Bm horizons if no significant change in soil texture was found). However, when soil profiles were described and sampled in detail, it was done on the basis of genetic soil horizons (Appendix 1). Of 2402 inspections (observations) made during the fieldwork in the survey area, 1179 were for both North and South Pender islands, 185 were for Prevost Island, 534 were for Mayne Island, 454 were for Saturna Island, and 50 were for the lesser islands (Samuel, Tumbo, Curlew, Cabbage, Georgeson, and Lizard).

This type of survey procedure is appropriate to a survey intensity of level 2, called detailed (Valentine and Lidstone 1985), having the following specifications: "At least one inspection in over 80% of delineations. One inspection per 4-25 ha. Boundaries checked along about 25% of total length in open country (15% in woodland). Other boundaries inferred from aerial photographs. Traverses less than 1 km apart. Inspection spacing about 200 m. Traverses mainly by foot and some by vehicle." The average number of hectares represented by one inspection (inspection density) in the survey area was 3.1 ha for North and South Pender islands, 4.4 ha for Mayne Island, 6.9 ha for Saturna Island, and 3.7 ha for Prevost Island.

An existing list of soils based on the soil legend for the Gulf Islands and east Vancouver Island from previous surveys was used, modified, and updated. Several new soils were added to this list. Soils were given names from the areas where they were first found, plus symbols to denote the names on the aerial photographs. The final list of soils became the legend on the soil map. Soils were classified according to The Canadian System of Soil Classification (Agriculture Canada Expert Committee on Soil Survey 1987). At the end of each field season, typical profiles of the major soils were described and sampled in detail. Once fieldwork was completed and the soils were named, described, classified, and delineated on aerial photographs, production of the final maps and legends was begun. The two soil maps accompanying this report are at a scale of 1:20 000.

Data handling

During the 1983 field season (survey of Mayne, Saturna, Prevost, and lesser islands), data collected at each inspection were recorded on a standardized daily record form specially designed for the survey and for subsequent computerized handling of data. Although the Pender islands were not part of this data collection method, we have assumed that the same soils on these islands would have yielded similar results for the soil properties. The properties (data variables) recorded for each inspection were recorded directly as measured numeric values (for example, as actual depths in centimetres or percent slope) or as letter (character) codes (for example, soil textures or classification), following specified coding guidelines. At the end of the field season the data were keypunched onto computer cards and were entered into the mainframe computer system at the University of British Columbia. The data were subsequently transferred to a MSDOS-based microcomputer. Data were transferred to the Aladin data base management package (Advanced Data Institute America Incorporated 1983) and were exported to a commercial spreadsheet (Lotus Development Corporation 1983) for statistical evaluation. Summary statistics (mean, minimum, and maximum values) were generated for numeric data (for example, coarse fragment content) and frequencies (counts) were generated for character data (for example, textures, classification). Data for 1228 inspections were analyzed.

For Mayne, Saturna, Prevost, and lesser islands, a polygon information form was developed and filled out for each mapped delineation (polygon). Recorded information includes the map unit symbol and slope classes; the symbol, slope class, and proportion of the dominant, subdominant, and minor soils (inclusions) that occurred in the delineation; and the number of inspections (observations) per delineation. Computerized data handling of the polygon information occurred in the same way as for the daily records. Summary statistics include mean, minimum, and maximum percentages of soils in each map unit. A total of 572 polygon forms were filled out during the field season and were analyzed.

Standardized forms and computerized data handling for large data sets have several advantages. Improvement in the detail, uniformity, and quality of description is usually found. If properties are described consistently and in a set order, the user can find the desired information more readily and also the collector records required data more accurately and consistently. A standard format greatly facilitates data entry for computer processing.

Computerized data handling allows for more efficient processing of data, and statistical evaluations such as frequency distributions are readily done (Smeck et al. 1980).

Reliability of mapping

These southern Gulf Islands have a good system of roads that provide easy access to all lowland areas, particularly in more heavily populated parts of the islands. At higher elevations and in less densely populated parts of the islands, there was less access and four-wheel drive vehicles were often necessary. Fieldwork involved traveling all available roads and tracks by motor vehicle. Areas inaccessible to motor vehicles were traversed by foot when the terrain was not too steep. Steep, inaccessible areas were not checked. On average, 2.7 inspections per delineation were made on the Pender islands, 2.0 for Mayne Island, 1.6 for Prevost Island, and 2.1 for Saturna Island, whereas 5.0 or more inspections per delineation were not uncommon for large delineations and for areas with complex soil materials and/or topography. Therefore, symbols within any delineation on the map do not describe accurately 100% of what is in that area. Mapping accuracy varies with access and complexity of soil parent materials, topography, depth to bedrock, and soil drainage. For example, because of the former influence of the sea between 0 and 100 m above mean sea level, complex depositional sequences took place that are reflected in intimately intermixed soil materials over very short distances. Generally, a higher density of inspections was needed in these areas, compared to that required for the less complex patterns of soil landscape at higher elevations.

Fig. 9 is a small-scale map of the location of all inspections and indicates the relative mapping accuracy for North and South Pender and Prevost islands. The inspection density reflects a combination of accessibility and complexity of the soil landscape. Based on the inspection density patterns in Fig. 9, two areas are identified that reflect relative levels of map reliability:

- areas at elevations up to 100 m above mean sea level, with a high inspection density, have a relatively higher expected reliability of mapping; and
- areas at elevations over 100 m above mean sea level, with a low inspection density, have a relatively lower expected reliability of mapping.

The soil maps show different areas of map units that have certain ranges of soils and soil properties. The reliability or accuracy of these ranges varies from one location of the map to another; it is never 100%. Therefore, to determine the qualities of a soil at a particular location a site inspection must be made.

Soil series

The soils are recognized, named, and classified according to The Canadian System of Soil Classification (Agriculture Canada Expert Committee on Soil Survey 1987) at the series level. Each named series consists of soils that have developed on similar parent materials and that are essentially alike in all major characteristics of their profile except for texture of the surface. Soil properties that are definitive for the soil series are texture, drainage, coarse fragment content, contrasting materials, thickness and degree of

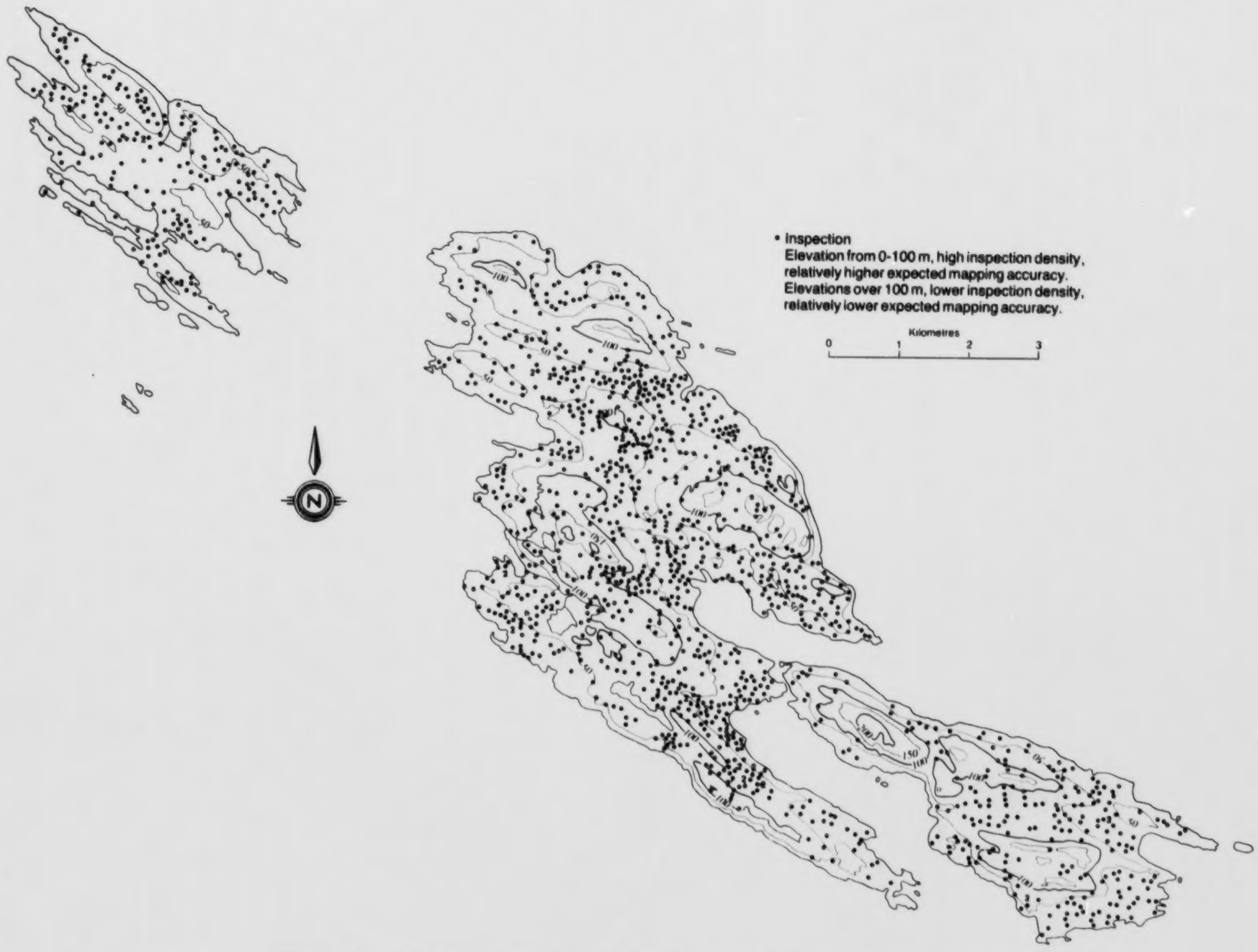
• Inspection
Elevation from 0-100 m, high inspection density, relatively higher expected mapping accuracy.
Elevations over 100 m, lower inspection density, relatively lower expected mapping accuracy.
Kilometres
0
1
2
3
N
50
100
150
200

Figure 9. Inspection density and relative mapping accuracy for North and South Pender and Prevost islands.

expression of horizons (for example, Ah and Bt horizon), and lithology. On these islands, 18 different soil series and 2 soil complexes are recognized (see map legends). In addition, one nonsoil unit is recognized and mapped that consists dominantly of Rock (RO).

A soil complex is used where two defined soil units are so intimately intermixed geographically that it is impractical, because of the scale of mapping, to separate them. Haslam soil complex includes the Galiano and Saturna soils, whereas Pender Island soil complex includes the Saturna and Salalakim soils.

Variability in one or more soil properties is common. Where this variability is common and consistent enough to be mapped and where it affects the use interpretations and management of the soil, it is expressed as a soil phase or variant in the map symbol. For example, an area with Saturna soil, in which bedrock occurs consistently within 50 cm of the surface, is mapped as a very shallow lithic phase (STsl). Soil phases and variants used on the islands are listed in the accompanying map legends. A maximum of two soil phases or variants were recorded and mapped for a soil.

Map units

Soils are shown on the soil maps either singly or grouped in map units. A map unit represents mappable portions of the soil landscape. Both soil and nonsoil (RO), called mapping individuals, occur as components in each map unit. A map unit contains one (called simple map unit) or more than one (called compound map unit) soil or nonsoil individual, plus a small proportion of a minor soil or nonsoil individual (called inclusions). The proportion of component soils, nonsoil, and inclusions varies within defined limits for the map unit from one delineation to another. The map unit reflects the combined total variation of all delineations that contain the same symbol (Mapping Systems Working Group 1981). The dominant soil of the map unit is the most common soil, occupying between 50-100% of the map unit. The subdominant soil is the less common soil, which occupies either between 25-50% of the map unit if limiting, or between 35-50% of the map unit if nonlimiting in the use interpretations. Minor soils or inclusions occupy up to 25% of the map unit if limiting, or up to 35% of the map unit if nonlimiting in the use interpretations. For example, 0-25% bedrock exposures in the Saturna (ST) map unit is a limiting inclusion. However, an example of a nonlimiting inclusion is 0-35% of an imperfectly drained Brigantine (BE) soil in the poorly drained Parksville (PA) map unit. Consequently, the proportion of the map unit with limiting inclusions is always lower (usually between 0 and 25%) compared to nonlimiting inclusions (usually between 0 and 35%). A soil can be simultaneously the dominant component of one map unit, the subdominant component of another map unit, and a minor component or inclusion in a third map unit. An example of such a soil is Tolmie (TL); dominant soil in TL simple map unit, subdominant soil in BE-TL and PA-TL map units, and mentioned as minor components (inclusions) in the CO map unit. Also, many map units (both simple and compound) have inclusions of one or more minor soils (see Part 4 of this report).

The map units are described in the legends to the accompanying map sheets and are identified by specific colors on the map according to parent materials of the dominant soil. Simple map units with dominant soils developed on moderately fine- to fine-textured marine materials are colored shades of blue (Brigantine, Cowichan, Fairbridge, Parksville, and Tolmie). Map units with dominant soils developed on fluvial parent materials are colored shades of red (Baynes, Beddis, Crofton, and Qualicum). Shades of yellow and light orange are used for simple map units with soils developed on colluvial materials (Galiano, Haslam soil complex, Pender Island soil complex, Salalakim, and Saturna). Shades of bright green are used for map units the dominant soils of which have compact till in the subsoil (Mexicana, St. Mary, and Trincomali). The Rock-dominated simple map unit is colored gray-brown. The Organic soil - dominated map unit is colored brown (Metchosin), whereas the anthropogenic soil - dominated map unit is colored purple (Neptune). Colors for compound map units are composed of a combination of the color for the dominant and subdominant soils in the map unit.

Each of the 30 different map units recognized on the islands are listed in Table 3 with the total number of delineations and areal extent. Table 3 also lists land types that are recognized on the islands; coastal beaches, made land, tidal flats, and small lakes (see also map legends). Land types are distinguished from map units by the lack of a slope symbol. Tables 4 and 5 show the number of delineations and areal extent by map sheet.

For map units, such as Rock (RO), Neptune (NT), and Metchosin (MT) in marshes or swamps, some areas on the map (delineations) are too small to be mapped separately. These areas are indicated by on-site symbols. Other on-site symbols are used on the map to indicate site-specific information, such as gravel pits, shale pits, escarpments, gullies, rock or stone piles, marshes or swamps, and water (ponds or dugouts). A list of on-site symbols is shown on the map legend.

Table 3. Total number of delineations and areal extent of each map unit and land type

Map unit		Number of delineations	Areal extent (ha)	Proportion of total area (%)
Symbol	Name			
BD	Beddis	22	64	0.6
BE	Brigantine	111	575	5.6
BE-TL	Brigantine-Tolmie	13	60	0.6
BY	Baynes	7	24	0.2
CF	Crofton	11	33	0.3
CO	Cowichan	25	166	1.6
FB	Fairbridge	12	69	0.7
GA	Galiano	122	1 128	11.0
GA-ME	Galiano-Mexicana	3	62	0.6
GA-QU	Galiano-Qualicum	5	53	0.5
HA	Haslam	14	155	1.5
HA-QU	Haslam-Qualicum	4	35	0.3
ME	Mexicana	10	37	0.4
MT	Metchosin	37	51	0.5
NT	Neptune	6	4	<0.1
PA	Parksville	27	194	1.9
PA-TL	Parksville-Tolmie	40	477	4.6
PD	Pender Island	11	151	1.5
QU	Qualicum	87	412	4.0
RO	Rock	75	600	5.8
RO-BH	Rock-Bellhouse	8	258	2.5
RO-PD	Rock - Pender Island	9	138	1.3
RO-SL	Rock-Salalakim	34	451	4.4
RO-ST	Rock-Saturna	83	1 137	11.1
SL	Salalakim	29	298	2.9
SM	St. Mary	3	16	0.2
ST	Saturna	99	2 878	28.0
ST-QU	Saturna-Qualicum	10	272	2.6
TL	Tolmie	76	297	2.9
TR	Trincomali	24	97	0.9
Land type				
Symbol	Name			
CB	Coastal beach	4	4	<0.1
MD	Made land	7	14	0.1
TF	Tidal flat	9	24	0.2
W	Small lake	19	51	0.5
	Total	1056	10 280	

Table 4. Number of delineations and areal extent of each map unit and land type for North Pender, South Pender, and Prevost islands map sheet

Map unit		Number of delineations	Areal extent (ha)	Proportion of total area (%)
Symbol	Name			
BD	Beddis	6	11	0.3
BE	Brigantine	69	413	9.6
BE-TL	Brigantine-Tolmie	7	19	0.4
CF	Crofton	3	3	0.1
CO	Cowichan	20	152	3.5
FB	Fairbridge	10	61	1.4
GA	Galiano	68	491	11.4
GA-ME	Galiano-Mexicana	3	62	1.4
HA	Haslam	11	126	2.9
HA-QU	Haslam-Qualicum	4	35	0.8
ME	Mexicana	10	37	0.9
MT	Metchosin	13	17	0.4
NT	Neptune	2	2	<0.1
PA	Parksville	11	51	1.2
PA-TL	Parksville-Tolmie	20	209	4.8
PD	Pender Island	8	97	2.2
QU	Qualicum	40	152	3.5
RO	Rock	42	228	5.3
RO-BH	Rock-Bellhouse	3	45	1.0
RO-PD	Rock - Pender Island	9	138	3.2
RO-SL	Rock-Salalakim	29	361	8.4
RO-ST	Rock-Saturna	45	530	12.2
SL	Salalakim	20	145	3.4
SM	St. Mary	3	16	0.4
ST	Saturna	42	506	11.7
ST-QU	Saturna-Qualicum	4	93	2.1
TL	Tolmie	45	174	4.0
TR	Trincomali	17	81	1.9
Land type				
Symbol	Name			
CB	Coastal beach	4	4	0.1
MD	Made land	4	8	0.2
TF	Tidal flat	7	15	0.3
W	Small lake	11	41	1.0
	Total	590	4320	

Table 5. Number of delineations and areal extent of map unit and land type for Mayne, Saturna, and lesser islands map sheet

Map unit		Number of delineations	Areal extent (ha)	Proportion of total area (%)
Symbol	Name			
BD	Beddis	16	53	0.9
BE	Brigantine	41	162	2.7
BE-TL	Brigantine-Tolmie	6	41	0.7
BY	Baynes	7	24	0.4
CF	Crofton	8	30	0.5
CO	Cowichan	5	14	0.2
FB	Fairbridge	2	7	0.1
GA	Galiano	54	637	10.7
GA-QU	Galiano-Qualicum	5	53	0.9
HA	Haslam	3	29	0.5
MT	Metchosin	24	34	0.6
NT	Neptune	4	2	<0.1
PA	Parksville	16	143	2.4
PA-TL	Parksville-Tolmie	20	268	4.5
PD	Pender Island	3	53	0.9
QU	Qualicum	47	260	4.4
RO	Rock	33	372	6.2
RO-BH	Rock-Bellhouse	5	213	3.6
RO-SL	Rock-Salalakim	5	90	1.5
RO-ST	Rock-Saturna	38	607	10.2
SL	Salalakim	9	153	2.6
ST	Saturna	57	2372	39.8
ST-QU	Saturna-Qualicum	6	179	3.0
TL	Tolmie	31	123	2.1
TR	Trincomali	7	16	0.3
Land type				
Symbol	Name			
MD	Made land	3	6	0.1
TF	Tidal flat	2	9	0.1
W	Small lakes	8	10	0.2
	Total	466	5959	

PART 4. DESCRIPTION OF SOILS AND MAP UNITS

This section contains information about soil and map unit properties. It describes how the basic units, the soils, are related and grouped together to form map units, which are then related to landscape properties. Each soil description is followed by map unit descriptions for which that soil is a dominant component.

DESCRIPTION OF SOILS

Descriptions for each of the 18 different soils, 2 soil complexes, and 1 nonsoil unit include sections on soil characteristics, water regime, variability in soil properties, similar soils to the one described, natural vegetation, land use of the soil, and in what map units the soil occurs.

After a description of each soil regarding the range in soil textures and coarse fragment content, the drainage, and the depth that is definitive for the soil, the section on soil characteristics includes data on observed ranges and calculated mean values for soil properties that relate to depth and thickness and for the coarse fragment content, and frequency of occurrence data for soil properties, such as texture, drainage class, and classification. Detailed profile descriptions for soils occurring most commonly are provided in Appendix 1.

Soil characteristics

Conventions used to describe soil characteristics are as follows:
For numeric data (for example, thickness of surface layer or cobble content of surface layer), the first three columns indicate mean, minimum, and maximum values for that property followed by the number of observations. A value of 160 cm corresponds with the depth of the control section (depth to which soil data were recorded) and indicates no value observed (for example, depth to bedrock or depth to mottles).
For character data (for example, texture or drainage), the frequency of occurrence in percent of different classes of that property are presented (for example, texture of subsurface layer: SL 56%, LS 25%, S 19%), followed by the number of observations.
LS, SL, L, and so on are the short forms for soil textures, explained in the map legend.
CF is the short form for coarse fragments.
Fine gravels range in size from 2 mm - 2.5 cm.
Coarse gravels range in size from 2.5 - 7.5 cm.
PSD is the short form for particle size discontinuity, which is used when significant changes in particle sizes occur between soil layers (horizons) as a result of material deposition. These changes have to be greater than one textural class on the texture triangle (for example, S-SL, SL-CL, L-C). Water movement is often impaired by particle size discontinuities (Miller 1973). PSD is used with Brigantine, Parksville, and St. Mary soils.

Variability

Conventions used to describe soil variability are as follows: Frequency of occurrence, expressed both as the number of observations and as the percentage of total number of soil observations, is presented for each soil phase or variant symbol in alphabetical sequence. Since some soil phases or variants occur in conjunction with others, the numbers may overlap, hence the total percentage frequency may be greater than 100. When soil variability is frequent and consistent enough to be mapped, it is expressed in the map symbols as a soil phase or variant for the delineation. Consequently, it is mentioned in the distribution and extent section.

Mean, followed by the range in values in parenthesis for numeric soil data, is presented in the variability column of this section (for example, coarse fragment content for very gravelly phase), after an explanation of the soil phase or variant symbol.

Further conventions used for soil descriptions, or the class limits for characteristics such as slope, can be found in The Canadian System of Soil Classification (Agriculture Canada Expert Committee on Soil Survey 1987) or in the map legend. Definitions of soil terms not explained in this report can be found in the Glossary of Terms in Soil Science (Canadian Society of Soil Science 1976).

DESCRIPTION OF MAP UNITS

Following each soil description are descriptions of map units for which that soil is a dominant component.

Each map unit description reports, based on all delineations of the map unit, the mean proportion in percent, followed in parenthesis by the range (minimum and maximum proportion in percent) occupied by the dominant, the subdominant, and the minor soils (inclusions) in the map unit, calculated from the delineation (polygon) data. A minor soil does not occur in all delineations of the map unit. One that occurs in more than 20% of the delineations is identified and listed. A minor soil that occurs infrequently (in less than 20% of the delineations) is not listed, but collectively these minor soils are called unmentioned inclusions. Occasionally, two minor soils occur in some delineations of the map unit.

Under landform and occurrence is described the landscape position, the surface form, and the dominant slopes for each map unit.

Under distribution and extent is described the geographic location of the map unit, the number and approximate size and shape of its delineations, and the areal extent of the map unit.

In the following sections soils and map units are described alphabetically. Detailed profile descriptions and analyses for the soils occurring most commonly are presented in alphabetical order in Appendixes 1 and 2.

BAYNES SOILS AND MAP UNITS

Baynes soils (BY)

Baynes soils are imperfectly drained soils that have developed on deep (>150 cm), fluvial, marine, or eolian materials of sandy loam to sand texture. Coarse fragment content is <20%. The profile description and analyses of a selected Baynes soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	117	12	160	19
Depth to bedrock (cm)	160	160	160	26
Depth to restricting layer (cm)	160	160	160	23
Depth to mottles (cm)	69	50	90	20
CF content surface layer (%)	6	0	17	23
Fine gravel content surface layer (%)	4	0	10	23
Coarse gravel content surface layer (%)	2	0	5	23
Cobble content surface layer (%)	0	0	2	23
CF content subsurface layer (%)	1	0	15	28
Fine gravel content subsurface layer (%)	1	0	10	28
Coarse gravel content subsurface layer (%)	0	0	5	28
Cobble content subsurface layer (%)	0	0	0	28

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(58), L(22), PEAT(10), LS(7), SIL(3)	31
Texture of subsurface layer	SL(56), LS(25), S(19)	16
Drainage class	Imperfect(65), poor(25), very poor(10)	31
Soil classification	GL.SB(42), O.HG(32), GL.DYB(23), HU.LG(3)	31
Type of restricting layer	Absent	
Perviousness	Rapid to moderate	

Water regime

Baynes soils are imperfectly drained with seasonal fluctuations in the water table. They are saturated to about 60 cm from the surface during winter months. Where seepage water occurs the subsoil may be moist throughout the rest of the year. Droughty conditions may occur during the summer when the water table drops to below 75 cm from the surface. The C horizon in some places has a massive structure of compact sand that is more slowly permeable than the overlying materials, which results in perched water table conditions.

Variability

Soil phase or variant	Frequency (no.)	Frequency (%)	Description of variability
BYa	13	42	Sombric variant: Ah or Ap horizon >10 cm
BYg	6	28	Gravelly phase: coarse fragment content in surface layer 20-50%; mean CF 25% (20-30%); also in conjunction with poorly drained (pd) and shallow (s) phases
BYlo	7	22	Loam phase: surface texture loam; mean thickness 25 cm (14-45 cm); also in conjunction with poorly drained (pd) phase
BYpd	11	35	Poorly drained phase: poorly drained (Gleysolic) instead of imperfectly drained; classified as either Orthic Humic Gleysols (O.HG) or Humic Luvic Gleysols (HU.LG); also in conjunction with shallow lithic (l), loam (lo), peaty (pt), and silt loam (si) phases
BYpt	3	10	Peaty phase: <60 cm of fibric organic material over mineral soil; mean thickness 47 cm (40-55 cm); only with poorly drained (pd) phase

Note: Other phases of the Baynes soil with very limited occurrence are: shallow lithic (l), shallow (s), and silt loam (si) phases.

Similar soils

Baynes soils are similiar to the Beddis soils that are rapid to moderately well drained. Baynes soils are also similar to the Qualicum soils that have a higher (>20%) coarse fragment content throughout the profile and are rapidly to moderately well drained.

Natural vegetation

Natural vegetation is characterized by western red cedar, red alder, and coast Douglas fir. The understory consists predominately of western sword fern (*Polystichum munitum*).

Land use

Most Baynes soils are tree covered. Some small areas of poorly drained Baynes soil have been cleared for agriculture, primarily for pasture. The soils are droughty, fertility is low, soil reactions are strongly acid, and the base exchange is also low. With improvements, such as drainage, irrigation, and high fertilizer inputs, these soils have good potential for producing a range of annual crops. At present, forestry represents their most common use.

Map units

Only one Baynes map unit is recognized, a simple map unit (BY) in which Baynes is the dominant soil. In addition, the Baynes soil occurs as a minor soil or unmentioned inclusion in some delineations of the Beddis (BD), Brigantine (BE), Qualicum (QU), and Trincomali (TR) map units.

Baynes map unit (BY)

The Baynes map unit consists dominantly (76%; 65-100%) of imperfectly drained Baynes soil. The map unit includes on average 24% (up to 35%) of other soils, which may be one or a combination of the following, common, minor soils; Beddis (BD) or Qualicum (QU). Unmentioned inclusions of other soils occur in a very few places.

On Tumbo Island, Baynes poorly drained and peaty phased (BYpd,pt) delineations have inclusions of up to 35% of shallow (60-160 cm), fibric, organic materials over mineral soils.

Inclusions of Qualicum soils somewhat limit the land use possibilities and use interpretations for this map unit because of the higher coarse fragment content. Beddis soils are nonlimiting inclusions.

Landform and occurrence

Soils of the Baynes map unit occur both in narrow areas on lower side-slope positions along drainageways as fluvial deposits and in draws and depressional areas as beach deposits. The topography is gently to moderately sloping (6-15%) and, occasionally, strongly sloping (16-30%). Qualicum or Beddis soils occur at random in the better-drained landscape positions in most Baynes delineations.

Distribution and extent

Baynes is a minor map unit that appears as seven small delineations on Mayne, Saturna, and Tumbo islands only. On Tumbo Island the delineations were mapped as BYpd,pt. On Saturna Island one delineation was mapped BYa and one BYlo. The others were mapped as BY. This map unit represents an area of 24 ha (0.3% of total map area).

BEDDIS SOILS AND MAP UNITS

Beddis soils (BD)

Beddis soils are rapidly to moderately well-drained soils that have developed on deep (>150 cm), fluvial, marine, or eolian materials of sandy loam to sand texture. Coarse fragment content is <20%. The profile description and analyses of a selected Beddis soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	111	20	160	22
Depth to bedrock (cm)	160	160	160	22
Depth to restricting layer (cm)	160	160	160	22
Depth to mottles (cm)	142	90	160	22
CF content surface layer (%)	9	0	20	28
Fine gravel content surface layer (%)	7	0	15	28
Coarse gravel content surface layer (%)	3	0	10	28
Cobble content surface layer (%)	0.1	0	3	28
CF content subsurface layer (%)	2	0	25	28
Fine gravel content subsurface layer (%)	2	0	15	28
Coarse gravel content subsurface layer (%)	1	0	10	28
Cobble content subsurface layer (%)	0	0	0	28

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(69), LS(29), L(2)	35
Texture of subsurface layer	S(28), LS(28), SL(28), L(16)	18
Drainage class	Well(52), moderately well(31), rapid(17)	35
Soil classification	O.DYB(69), O.SB(28), O.HFP(3)	35
Type of restricting layer	Absent	
Perviousness	Rapid to moderate	

Water regime

Beddis soils are rapidly to moderately well-drained with water tables remaining below 100 cm throughout the year. The soil remains moist during the winter months, but quickly becomes droughty in dry periods during the summer. The C horizon may occasionally have a massive structure of compact sand that is more slowly permeable than the overlying materials but not enough to create perched water table conditions.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
BDa	9	28	Sombric variant: Ah or Ap horizon >10 cm; also in conjunction with shallow lithic (1) phase

BDg	5	14	Gravelly phase: coarse fragment content in surface layer 20-50%; mean CF 33% (25-40%); also in conjunction with very shallow lithic (sl) phase
BDl	4	11	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 86 cm (57-100 cm); also in conjunction with sombric (a) variant
BDs	4	11	Shallow phase: less deep (50-100 cm) than specified, over similar materials but with >20% coarse fragments; mean depth 56 cm (50-60 cm); mean CF in subsoil 54% (45-60%)

Note: Other phases and variants of the Beddis soil with very limited occurrence are: loam (lo) and very shallow lithic (sl) phases and taxonomy change (t) variant.

Similar soils

Beddis soils are similar to Qualicum soils, which have a higher (>20%) coarse fragment content throughout the profile. Beddis soils are similar to the Baynes soil that is imperfectly drained.

Natural vegetation

Natural vegetation is characterized by coast Douglas fir, grand fir, occasionally shore pine, and scattered Pacific madrone. Western hemlock occurs on some sites with a northerly aspect. The understory consists of salal, western bracken (*Pteridium aquilinum*), and dull Oregon-grape.

Land use

Most Beddis soils are tree covered. Some small areas have been cleared over the years for agricultural purposes, mainly for pasture and hay crops. The soils are very droughty and fertility is low. Soil reactions are strongly acid (pH 5.1-5.5) and the base exchange is low. With improvements, such as irrigation and high inputs of fertilizer, these soils have good potential for producing a range of annual crops and tree fruits. Currently, forestry represents their most common use.

Map units

Only one Beddis map unit is recognized, a simple map unit in which Beddis is the dominant soil. In addition, the Beddis soil occurs as a minor soil or unmentioned inclusion in some delineations of Baynes (BY), Brigantine (BE), Brigantine-Tolmie (BE-TL), Galiano (GA), Galiano-Mexicana (GA-ME), Galiano-Qualicum (GA-QU), Parksville (PA), Parksville-Tolmie (PA-TL), Pender Island (PD), Qualicum (QU), and Saturna-Qualicum (ST-QU) map units.

Beddis map unit (BD)

The Beddis map unit consists dominantly (80%; 65-100%) of well- to moderately well-drained Beddis soil. The map unit includes on average 20% (up to 35%) of other soils. These other soils may be one or a combination of the following soils: Qualicum (QU), Brigantine (BE), Galiano (GA), or Saturna (ST) of which the Qualicum soils occur most widely. Unmentioned inclusions of other soils occur in a very few places.

Qualicum and Brigantine soils somewhat limit land use possibilities and use interpretations for this map unit because of the higher coarse fragment content and the wetter (imperfect) drainage respectively. The colluvial soils (GA and ST) limit the land use possibilities and use interpretations because of the higher coarse fragment content and shallowness to bedrock.

Landform and occurrence

Soils of the Beddis map unit occur both as narrow, discontinuous terraces along drainageways and as old beach deposits, on very gently to moderately sloping (2-15%), and on some steeper sloping (16-30%) terrain. Elevation ranges from 0 to 150 m above mean sea level. Inclusions of other soils occur at random.

Distribution and extent

Beddis is a minor map unit. It has been mapped as 22 small- and medium-sized delineations throughout the survey area. No Beddis delineations are mapped on South Pender Island. Nine of the Beddis delineations are mapped as BD, seven as BDg, three as BDa, one each as BDl, BDlo, and BDs. This map unit represents an area of 64 ha (0.6% of total map area).

BELLHOUSE SOILS AND MAP UNITS

Bellhouse soils (BH)

No simple Bellhouse (BH) map unit appears on the accompanying map sheets and, for this reason, there is no description of a Bellhouse map unit following the soil description.

Bellhouse soils are well-drained soils that have developed on shallow colluvial and glacial drift materials of channery, sandy loam texture over fractured or smooth, unweathered sandstone bedrock within 100 cm. Coarse fragment content varies between 20 and 50%. The soil has a dark-colored Ah horizon of at least 10 cm thick that is high in organic matter content. The profile description and analyses of a selected Bellhouse soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	46	15	95	13
Depth to bedrock (cm)	49	15	95	16
Depth to restricting layer (cm)	49	15	95	15
Depth to mottles (cm)	160	160	160	18
CF content surface layer (%)	31	27	35	5
Fine gravel (channery) content surface layer (%)	18	10	25	5
Coarse gravel (channery) content surface layer (%)	11	5	20	5
Cobble (flaggy) content surface layer (%)	2	0	5	5 5
CF content subsurface layer (%)	30	30	30	2
Fine gravel (channery) content subsurface layer (%)	13	10	15	2
Coarse gravel (channery) content subsurface layer (%)	13	10	15	2
Cobble (flaggy) content subsurface layer (%)	5	0	10	2

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(83), L(17)	18
Texture of subsurface layer	SL(100)	2
Drainage class	Well(100)	18
Soil classification	O.SB(100)	18
Type of restricting layer	Sandstone bedrock	
Perviousness	Rapid to moderate	

Water regime

Bellhouse soils are well drained. They remain moist throughout the winter but are droughty from late spring to late fall. After infiltration, excess water drains freely and rapidly on top of the underlying sloping bedrock to lower areas.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
BHl	6	33	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 78 cm (60-95 cm); also in conjunction with loam (lo), paralithic (pl), nongravelly (ng), and very gravelly (vg) phases
BHlo	3	17	Loam phase: surface texture is loam; mean thickness 20 cm (10-40 cm); also in conjunction with nongravelly (ng), paralithic (pl), shallow lithic (l), and very shallow lithic (sl) phases
BHng	7	39	Nongravelly phase: coarse fragment content in surface layer <20%; mean CF 7% (0-15%); also in conjunction with loam (lo), paralithic (pl), shallow lithic (l), and very shallow lithic (sl) phases
BHsl	10	56	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 32 cm (15-45 cm); also in conjunction with loam (lo), nongravelly (ng), paralithic (pl), and very gravelly (vg) phases
BHvg	6	33	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 59% (50-70%); also in conjunction with deep (d), shallow lithic (l), and very shallow lithic (sl) phases

Note: Other phases of the Bellhouse soil with limited occurrence are: deep (d) and paralithic (pl) phases.

Similar soils

Bellhouse soils are similar to Saturna soils, which have thinner Ah or Ap horizons (0-10 cm). Saturna soils are found on all aspects, whereas Bellhouse soils are more restricted to southerly and southwesterly aspects.

Natural vegetation

The natural vegetation is quite distinctive and consists of scattered clumps of Garry oak, coast Douglas fir, and Pacific madrone. Garry oak is a unique species, restricted to warm and dry southerly and southwesterly aspects. Tree growth is often stunted from lack of moisture. The ground cover is predominantly grasses, spring flowers, common gorse, and Scotch broom.

Land use

Because of the shallow soil to bedrock, topographic limitations, and droughtiness, uses of Bellhouse soils are restricted mainly to their natural vegetation and to limited sheep grazing.

Map units

Bellhouse soils occur only as the subdominant soil in one compound map unit in the survey area, the Rock-Bellhouse (RO-BH) map unit, which is described under Rock (RO). In addition, Bellhouse soils occur as a minor soil or unmentioned inclusion in some delineations of the Rock (RO), Rock-Saturna (RO-ST), and Trincomali (TR) map units.

Landform and occurrence and distribution and extent of Bellhouse soils are described under the corresponding sections in the description for the compound map unit, Rock-Bellhouse (RO-BH).

BRIGANTINE SOILS AND MAP UNITS

Brigantine soils (BE)

Brigantine soils are imperfectly drained soils that have between 10 and 95 cm of a sandy loam to loamy sand of marine or fluvial origin overlying deep (>100 cm), silty clay loam to clay loam textured, marine deposits that are usually stone free. Coarse fragment content of the overlay materials is <20%. The profile description and analyses of a selected Brigantine soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	66	10	95	61
Thickness of 2nd layer (cm)	29	5	85	61
Depth to bedrock (cm)	160	160	160	54
Depth to restricting layer (cm)	70	40	95	69
Depth to mottles (cm)	69	50	160	54
Depth to PSD (cm)	70	40	95	64
CF content surface layer (%)	8	0	19	62
Fine gravel content surface layer (%)	5	0	15	62
Coarse gravel content surface layer (%)	3	0	10	62
Cobble content surface layer (%)	0	0	10	62
CF content 2nd layer (%)	6	0	70	123
Fine gravel content 2nd layer (%)	3	0	40	123
Coarse gravel content 2nd layer (%)	2	0	20	123
Cobble content 2nd layer (%)	0	0	15	123
CF content 3rd layer (%)	0	0	10	123
Fine gravel content 3rd layer (%)	0	0	10	123
Coarse gravel content 3rd layer (%)	0	0	5	123
Cobble content 3rd layer (%)	0	0	0	123

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(71), LS(14), L(13), S(2)	123
Texture of 2nd layer	SICL(42), SL(16), CL(13), LS(8), SIC(6), L(5), SCL(5), S(5)	123
Texture of 3rd layer	SICL(54), CL(17), SIC(15), SCL(10), SL(4)	41
Drainage class	Imperfect(92), moderately well(4), well(4)	123
Soil classification	GL.SB(54), GL.DYB(35), O.DYB(6), O.SB(4), GLE.DYB(1)	123
Type of restricting layer	Fine-textured subsoil, often massive structured	
Perviousness	Slow	

Water regime

Brigantine soils are imperfectly drained with seasonal fluctuations in the water table. They are saturated to within 60 cm of the surface during winter. Seepage water maintains the subsoil in a moist condition throughout the rest of the year. Droughty conditions may occur during the summer when the water table drops below 75 cm from the surface. Perched water table conditions may occur above the fine-textured subsoil.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
BEa	71	58	Sombric variant: Ah or Ap horizon >10 cm; also in conjunction with deep (d), gravelly (g), and loam (lo) phases, and taxonomy change (t) variant
BEd	51	40	Deep phase: depth to fine-textured subsoil 100-150 cm; mean depth 122 cm (100-150 cm); also in conjunction with sombric (a) and taxonomy change (t) variants and with gravelly (g), loamy (lo), and very gravelly (vg) phases
BEg	44	35	Gravelly phase: coarse fragment content in surface layer 20-50%; mean CF 33% (20-45%); also in conjunction with sombric (a) variant, deep (d), loam (lo), and shallow lithic (l) phases
BElo	16	13	Loam phase: surface texture is loam; mean thickness 25 cm (11-60 cm); also in conjunction with deep (d) and gravelly (g) phases and sombric (a) variant

BEt	12	10	Taxonomy change variant: taxonomy differs from specified classification (Gleyed Dystric Brunisol) because drainage is better (well to moderately well) than specified for soils, or because taxonomy is Gleyed Eluviated Dystric Brunisol (GLE.DYB); also in conjunction with sombric (a) variant, deep (d), and very gravelly (vg) phases
BEvg	12	10	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 58% (50-75%); also in conjunction with sombric (a) and taxonomy change (t) variants and with deep (d) phase

Note: Other phases of the Brigantine soil with very limited occurrence are shallow lithic (l) and bouldery (b) phases.

Similar soils

Brigantine soils are similar to poorly drained Parksville soils. Shallow Brigantine soils over compact till materials within 100 cm of the surface has been mapped as St. Mary soils. Brigantine soils with coarse- to moderately coarse-textured overlays thicker than 150 cm have been classified and mapped as Baynes soils or as the better-drained Beddis or Qualicum soils, depending on the coarse fragment content.

Natural vegetation

The natural vegetation consists of western red cedar, red alder, and coast Douglas fir. The understory includes western sword fern, salal, and western bracken.

Land use

Brigantine soils in the survey area are used for pasture and hay crops and for growing trees. For agricultural purposes, the soils remain cold till late spring and are strongly acid (pH 5.1-5.5). The upper horizons have a moderately low moisture-holding capacity. The soils have low inherent fertility, consequently, large amounts of fertilizer are required to produce a good crop. Brigantine soils improved with irrigation and subsurface drainage, become some of the better agricultural soils and can produce a wide range of crops and tree fruits.

Map units

Brigantine soils are some of the most widely mapped soils in the survey area and occur in several map units. In addition to the simple map unit BE, Brigantine soils have also been mapped as the dominant soil in the Brigantine-Tolmie (BE-TL) map unit. In addition, Brigantine soils occur as a minor soil or unmentioned inclusion in some delineations of Beddis (BD), Fairbridge (FB), Galiano (GA), Parksville (PA), Parksville-Tolmie (PA-TL), Pender Island (PD), Qualicum (QU), and Tolmie (TL) map units.

Brigantine map unit (BE)

The Brigantine map unit consists dominantly (82%; 60-100%) of imperfectly drained Brigantine soil. The map unit includes on average 18% (up to 40%) of other soils, of which the Parksville (PA) soil is the most widely occurring minor soil. Unmentioned inclusions of other soils occur very sparsely.

The poorly drained soils are the most limiting inclusions for use interpretations of this map unit. The high coarse fragment content of the Qualicum soils is also limiting. Beddis soils do not limit the use interpretations for this map unit.

Landform and occurrence

Soils of the Brigantine map unit occur on very gentle to moderate slopes (2-15%) as narrow areas surrounding depressional basins and as draws occupied by poorly drained soils, usually Parksville but occasionally Tolmie or Cowichan soils. Parksville soils occur in the lowest landscape positions as small unmappable inclusions (0-30%) in about one-third of the Brigantine (BE) delineations. The inclusions of other minor soils occur at random in the Brigantine landscape position. Elevation usually ranges from 0 to 100 m above mean sea level.

Distribution and extent

The Brigantine map unit is a major one. It has been mapped as 111 small- to medium-sized, often narrow delineations throughout the survey area. Of these, 16 delineations were mapped as BEd, 25 as BEg, and 29 as BEd,g. In addition to these widely occurring phases for the Brigantine map unit, 18 delineations were mapped without any phases (BE). Only a few delineations each were mapped for other soil phases such as BEa; BEd,a; BEg,a; BEa,t; BEg,lo; BElo; and BEvg. The Brigantine map unit represents 575 ha (5.6% of total map area).

Brigantine-Tolmie map unit (BE-TL)

Brigantine soil dominates this map unit (52%; 30-70%). The map unit also contains 35% (25-50%) of poorly drained soils developed on deep, loam to silty clay textured (usually stone free), marine deposits (mainly Tolmie but some Cowichan soils). The map unit includes on average 13% (up to 30%) of other soils, of which Parksville (PA) soils are the most widely occurring minor soils. Unmentioned inclusions of other soils occur very infrequently. The poorly drained Cowichan, Tolmie, and Parksville soils adversely affect use interpretations for this map unit.

Landform and occurrence

Soils of the Brigantine-Tolmie (BE-TL) map unit occur on very gentle to gentle (2-9%) slopes as narrow areas surrounding depressional basins and draws that are occupied by poorly drained Tolmie (Cowichan) soils. Tolmie (Cowichan) and Parksville soils occupy the lowest landscape positions as significant portions (25-50%) of the map unit. Minor inclusion of other soils occur at random. Elevation usually ranges between 0 and 100 m above mean sea level.

Distribution and extent

The Brigantine-Tolmie map unit has been mapped less widely than BE map units and has 13 relatively small delineations throughout the survey area. Five of the delineations were mapped as BEg-TL, two as BEd-TL, two as BEd,g-TL, two as BE-TL, one as BEa-TL, and one as BEsi-TLpt. It represents 60 ha (0.6% of total map area).

COWICHAN SOILS AND MAP UNITS

Cowichan soils (CO)

Cowichan soils are poorly to very poorly drained soils that have developed on silt loam over deep (>100 cm) silty clay loam to silty clay marine deposits that are usually stone free. These soils are generally well-developed Humic Luvic Gleysols or Orthic Humic Gleysols. They have a dark-colored Ah or Ap horizon and, in many places, a leached (Ae) horizon and a well-developed Btg horizon. The profile description and analyses of a selected Cowichan soil are given in the Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	30	10	125	37
Depth to bedrock (cm)	160	160	160	37
Depth to restricting layer (cm)	26	0	50	37
Depth to mottles (cm)	26	0	160	37
CF content surface layer (%)	2	0	15	36
Fine gravel content surface layer (%)	1	0	5	36
Coarse gravel content surface layer (%)	1	0	10	36
Cobble content surface layer (%)	0	0	5	36
CF content subsurface layer (%)	1	0	10	37
Fine gravel content subsurface layer (%)	0	0	5	37
Coarse gravel content subsurface layer (%)	0	0	10	37
Cobble content subsurface layer (%)	0	0	0	37

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SIL(51), PEAT(27), SICL(19), CL(3)	37
Texture of subsurface layer	SICL(44), SIC(44), SIL(9), C(3)	34
Drainage class	Poor(87), very poor(13)	37
Soil classification	HU.LG(75), O.HG(17), R.HG(5), O.G(3)	36
Type of restricting layer	Fine-textured Btg horizon or massive-structured subsoil	
Perviousness	Slow	

Water regime

The Cowichan soils are poorly to very poorly drained soils that have distinct to prominent mottles within 50 cm of the surface. They are wet for long periods throughout the year with water tables at or within 30 cm of the surface during winter months (December to March). Water tables drop quickly below 60 cm from the surface in early April and remain there until early November. Water tables in the Cowichan soils fluctuate rapidly over short periods after rainfall or drought. Perched water table conditions occur temporarily on top of the fine-textured Btg horizon. These soils receive runoff water from the surrounding landscape, as a result of their low landscape position.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
COpt	10	27	Peaty phase: < 40 cm of mesic or humic organic materials over mineral soil; mean thickness 20 cm (10-30 cm)

Note: Other phases and variants of the Cowichan soil with very limited occurrence are: gravelly (g) phase and taxonomy change (t) variant.

Similar soils

Cowichan soils are similar to the poorly drained Tolmie soils. The latter often have a less uniform texture and are usually more distinctly mottled in the subsoil than are the Cowichan soils. Cowichan soils are somewhat related to the poorly drained alluvial Crofton soils that are much more variable in texture than the Tolmie soils. The imperfectly drained member of the Cowichan soils is a Fairbridge soil.

Natural vegetation

Nearly all the larger areas of Cowichan soils have been cleared for agriculture. Natural vegetation on the remaining areas, which are often small and narrow, consists of red alder and western red cedar, and frequently consists of bigleaf maple. The shrubs are represented by patches of salmonberry and hardhack. The herb layer is characterized by western sword fern, American skunk-cabbage (*Lysichiton americanum*), rushes (*Juncus* spp.), sedges (*Carex* spp.), and common horsetail (*Equisetum arvense*).

Land use

Cowichan soils represent some of the most important agricultural soils in the survey area. The surface soil is well supplied with organic matter and nitrogen. They are strongly acidic (pH 5.1-5.5) soils. Poor drainage is the major limitation for growing a large variety of agricultural crops on these soils, and, for this reason, they are used mainly for pasture and hay crops.

With improved drainage (for example, artifical drainage), these soils are good for growing a wide variety of crops, including vegetables, berries, and small fruits.

Map units

Cowichan soils are the dominant soil in the simple Cowichan (CO) map unit. In addition, Cowichan soils occur as a minor soil or unmentioned inclusion in some delineations of the Brigantine-Tolmie (BE-TL), Crofton (CF), Fairbridge (FB), Parksville-Tolmie (PA-TL), and Tolmie (TL) map units.

Cowichan map unit (CO)

The Cowichan map unit consists dominantly (87%; 70-100%) of poorly to very poorly drained Cowichan soil. The map unit includes on average 13% (up to 30%) of other soils, of which Tolmie (TL) soil is the most widely occurring minor soil. Unmentioned inclusions of other soils occur very sparsely. Inclusions of Tolmie soils are not limiting the use interpretations for this map unit.

Landform and occurrence

Soils of the Cowichan map unit are found in low lying to very gently sloping (0-5%) landscape positions, such as depressions, basins, and swales, in which the former sea deposited large amounts of fine-textured sediments. They also occur in between bedrock ridges with shallow colluvial soils, often receiving runoff water from the surrounding landscape. Tolmie soils occur in the form of many small inclusions not exceeding 30% of the map unit. Other minor inclusions also occur at random. Elevations usually range from 0 to 100 m above mean sea level.

Distribution and extent

Cowichan is a minor map unit. It has been mapped as 25 small- to medium-sized delineations, of which 12 occur on North and South Pender islands and on Prevost Island. Two of the Cowichan delineations are mapped as COpt and one as COg. All other delineations are mapped as CO. This map unit represents an area of 166 ha (1.6% of total map area).

CROFTON SOILS AND MAP UNITS

Crofton soils (CF)

Crofton soils are poorly to very poorly drained soils that have developed on recent, fluvial (alluvial), stratified deposits of loam to silty clay loam texture, usually over coarse materials with sandy loam texture at variable depth (10-110 cm). Coarse fragment content in the subsoil is < 25%. The profile description and analyses of a selected Crofton soil are given in the Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	53	10	110	18
Depth to bedrock (cm)	160	160	160	13
Depth to restricting layer (cm)	126	0	160	13
Depth to mottles (cm)	45	10	110	18
CF content surface layer (%)	2	0	10	16
Fine gravel content surface layer (%)	1	0	5	16
Coarse gravel content surface layer (%)	1	0	5	16
Cobble content surface layer (%)	0	0	0	16
CF content subsurface layer (%)	3	0	25	16
Fine gravel content subsurface layer (%)	3	0	25	16
Coarse gravel content subsurface layer (%)	1	0	5	16
Cobble content subsurface layer (%)	1	0	5	16

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SIL(39), SICL(28), L(17), CL(11), PEAT(5)	18
Texture of subsurface layer	SL(70), L(6), CL(6), SCL(6), SICL(6), LS(6)	16
Drainage class	Poor(56), imperfect(28), very poor(11), moderately well(5)	18
Soil classification	O.HG(56), GL.SB(28), R.HG(6), O.G(5), O.SB(5)	18
Type of restricting layer	Change in particle size: fine-textured subsoil underlying coarse-textured surface or coarser-textured subsoil underlying finer-textured surface layer	
Perviousness	Moderate to slow	

Water regime

Crofton soils are poorly to very poorly drained with high water tables usually near the surface for most of the year. They have distinct to prominent mottles within 50 cm of the surface. Average water table depth during the driest part of the summer is at about 50 cm (0-110 cm). As bottomland soils, they receive large quantities of runoff water from the surrounding landscape as well as from seepage water. Imperfectly drained Crofton soils often occur on the gentle side slopes of drainageways.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
CFid	5	28	Imperfectly drained phase: better drained (Gleyed subgroups) than specified for soil; also in conjunction with gravelly (g) phase

Note: Other phases and variants of the Crofton soil with very limited occurrence are: gravelly (g), shallow lithic (l), and peaty (pt) phases and taxonomy change (t) variant.

Similar soils

Crofton soils are the only alluvial soils found in the survey area. Without the coarse-textured subsoil materials they resemble Cowichan and Tolmie soils. However, Crofton soils have more variable textures of coarser materials and are often more poorly drained than are the Cowichan and Tolmie soils.

Natural vegetation

The natural vegetation consists of western red cedar, red alder, and bigleaf maple. The ground cover includes western sword fern, rushes, sedges, American skunk cabbage, horsetail, and western bracken.

Land use

With few exceptions, current land use of Crofton soils is restricted to their natural vegetation. Some selective logging took place about 60 years ago. These soils are best for growing deciduous trees. Clearing for agricultural purposes has not occurred because of the high water tables, the risk of flooding, and the often narrow delineations (drainageways and stream channels).

Map units

Crofton soils occur in one simple map unit in the survey area, the Crofton (CF) map unit. In addition, Crofton soils occur as a minor soil or unmentioned inclusion in some delineations of the Baynes (BY), Brigantine (BE), Metchosin (MT), Parksville (PA), and Tolmie (TL) map units.

Crofton map unit (CF)

The Crofton map unit includes on average 18% (up to 30%) of other soils, which may be one, or a combination, of the following minor soils: Cowichan (CO), Tolmie (TL), Metchosin (MT), or Crofton soils that are imperfectly drained (CFid). Tolmie soils occur most widely in the Crofton map unit. Inclusions of Tolmie and Cowichan soils do not limit the use interpretations for this map unit.

Landform and occurrence

Soils of the Crofton map unit are usually found on floodplains, along stream channels, and at the bottom of creek beds. They also occur along narrow, continuous drainage channels with intermittent flow on very gentle to moderate slopes (2-15%), frequently in between bedrock ridges. The alluvial processes are active, resulting in deposition and erosion of sediments that may cause changes in soil texture. Tolmie and Cowichan inclusions occur at random. The Metchosin inclusions occur in the poorest drained, depressional landscape positions. Inclusions of the imperfectly drained phase of Crofton (CFid) occur in the better-drained side-slope positions. Soils of this map unit occur at all elevations.

Distribution and extent

The Crofton map unit is a very minor one. It has been mapped as 11 small delineations of which 8 occur on Saturna Island. On Saturna Island, one long, narrow delineation occurs along Lyall Creek. On South Pender Island two small delineations occur in the drainageway for Greenburn Lake. There, one delineation was mapped as CFpt and one as CFg,id. This map unit represents an area of 33 ha (0.3% of total map area).

FAIRBRIDGE SOILS AND MAP UNITS

Fairbridge soils (FB)

Fairbridge soils are imperfectly drained soils that have developed on silt loam to loam over deep (>100 cm), silty clay loam to clay loam, marine deposits that are usually stone free. Concretions of iron oxide may be present in the B horizons. The profile description and analyses of a selected Fairbridge soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	54	10	120	20
Depth to bedrock (cm)	160	160	160	20
Depth to restricting layer (cm)	58	30	130	14
Depth to mottles (cm)	59	50	75	11
CF content surface layer (%)	4	0	15	16
Fine gravel content surface layer (%)	3	0	10	16
Coarse gravel content surface layer (%)	1	0	5	16
Cobble content surface layer (%)	0	0	0	16
CF content subsurface layer (%)	4	0	15	13
Fine gravel content subsurface layer (%)	3	0	10	13
Coarse gravel content subsurface layer (%)	1	0	5	13
Cobble content subsurface layer (%)	0	0	0	13

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SIL(50), L(40), CL(10)	20
Texture of 2nd layer	SICL(39), L(22), CL(17), SL(17), SCL(5)	18
Texture of 3rd layer	SICL(75), SIL(25)	4
Drainage class	Imperfect(75), moderately well(20), well(5)	20
Soil classification	GL.SB(50), GL.DYB(25), O.SB(15), O.DYB(5), CU.HR(5)	20
Type of restricting layer	Fine-textured subsoil, often massive structured	
Perviousness	Slow	

Water regime

Fairbridge soils are imperfectly drained soils with distinct to prominent mottles between 50 and 100 cm. They are saturated to within 60 cm of the surface during the winter months, often by a perched water table. The water table drops quickly in spring and droughty conditions may even prevail during extended dry periods in the summer.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
FBa	14	70	Sombric variant: Ah or Ap horizon >10 cm; also in conjunction with taxonomy change (t) variant
FBt	5	25	Taxonomy change variant: taxonomy differs from specified classification (Gleyed Eluviated Dystric Brunisol) because drainage is better (well to moderately well) than specified for soil; also in conjunction with sombric (a) variant
FBg	-	-	Gravelly phase: coarse fragment content in surface layer 20-50%

Note: There is also very limited occurrence of the shallow lithic (l) phase of the Fairbridge soil.

Similar soils

Fairbridge soils are similar to the poorly drained Cowichan soil where profile textures are relatively uniform, and to the poorly drained Tolmie soil where profile textures are more variable.

Natural vegetation

The natural vegetation consists of red alder, western red cedar, coast Douglas fir, and bigleaf maple. The understory consists of western sword fern, salal, nettles (Urtica spp.), and western bracken.

Land use

Like the Cowichan soils, most of the land with Fairbridge soils in the survey area has been cleared for agriculture. Fairbridge soils are considered to be one of the better agricultural soils in the survey area. They are used for hay production and pasture, but they could be used for a large range of crops upon improvement. Because of droughty conditions during the summer, irrigation is recommended for maximum production. The soil reaction, usually strongly to moderately acid (pH 5.1-6.0), is occasionally very strongly acid (pH 4.5-5.0). The fertility level and organic matter content of Fairbridge soils are relatively low. Soil structure deterioration, such as compaction and puddling, results after repeated cultivation under wet soil conditions but can be controlled with good soil management techniques.

Map units

Fairbridge soils occur as the dominant soil in the Fairbridge (FB) simple map unit and as a minor soil or unmentioned inclusion in some delineations of the Brigantine (BE), Cowichan (CO), and Tolmie (TL) map units.

Fairbridge map unit (FB)

The Fairbridge map unit consists dominantly (75-100%) of the imperfectly drained Fairbridge soil. The Fairbridge map unit includes up to 25% inclusions of other soils. These other soils may be one or a combination of the following widely occurring minor soils: Cowichan (CO), Tolmie (TL), or Brigantine (BE). Unmentioned inclusions of other soils occur very sparsely. The poorly drained soils are limiting the use interpretations for this map unit.

Landform and occurrence

Soils of this map unit occur on subdued (undulating) terrain with very gentle to gentle slopes (2-9%), in which minor areas of the poorly drained soils occupy lower landscape positions at random. Brigantine soil inclusions occur scattered in the Fairbridge landscape. Elevations are usually between 0 and 100 m above mean sea level.

Distribution and extent

The Fairbridge map unit is a minor one. It has been mapped as 12 small- to medium-sized delineations of which 9 occur on North Pender Island. Prevost Island has one and Saturna Island has two Fairbridge delineations. One delineation was mapped as FBg, one as FBl, and the two delineations on Saturna Island were mapped as FBa,t. All other delineations were mapped without soil phases (FB). The Fairbridge map unit represents an area of 69 ha (0.7% of total map area).

GALIANO SOILS AND MAP UNITS

Galiano soils (GA)

Galiano soils are well-drained, shaly loam textured soils that have developed on shallow colluvial, residual, and glacial drift materials of weathered shale or siltstone over shale or siltstone bedrock within 100 cm of the surface. These soils usually have a thick layer of fractured bedrock (paralithic) between the solum and the unweathered consolidated bedrock. Coarse fragment content is between 20 and 50%, often increasing with depth. The profile description and analyses of a selected Galiano soil are given in the Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	43	10	100	116
Depth to bedrock (cm)	43	10	100	116
Depth to restricting layer (cm)	124	35	160	116
Depth to mottles (cm)	160	160	160	121
CF content surface layer (%)	36	17	45	49
Fine gravel (shaly) content surface layer (%)	21	10	30	49
Coarse gravel (shaly) content surface layer (%)	13	2	25	49
Cobble (flaggy) content surface layer (%)	2	0	15	49
CF content subsurface layer (%)	59	5	80	5
Fine gravel (shaly) content subsurface layer (%)	34	5	70	5
Coarse gravel (shaly) content subsurface layer (%)	25	0	45	5
Cobble (flaggy) content subsurface layer (%)	0	0	0	5

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	L(95), SL(4), CL(1)	122
Texture of subsurface layer	L(67), SIL(17), CL(16),	6
Drainage class	Well(94), moderately well(6)	122
Soil classification	O.DYB(91), O.SB(9)	122
Type of restricting layer	Consolidated shale bedrock	
Perviousness	Moderate	

Water regime

Galiano soils are well-drained soils. Faint mottling may occur in the subsoil. They are wet during winter but are usually droughty during summer months. Water tables do not remain within 100 cm of the surface for any prolonged period. During and shortly after wet periods, water may flow laterally through a saturated subsoil on top of sloping bedrock.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
GAa	11	9	Sombric variant: Ah or Ap horizon >10 cm; in conjunction with nongravelly (ng), shallow lithic (l), and very shallow lithic (sl) phases
GAb	3	2	Bouldery phase: >50% rock fragments >60 cm in diameter; used as soils in colluvial toe slope positions below rock ridges and escarpments; in conjunction with shallow lithic (l) and very shallow lithic (sl) phases
GAd	6	5	Deep phase: depth to bedrock 100-150 cm; mean depth 143 cm (110-160 cm); also in conjunction with nongravelly (ng) and very gravelly (vg) phases
GAl	29	24	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 69 cm (50-100 cm); also in conjunction with sombric (a) variant and bouldery (b), nongravelly (ng), and very gravelly (vg) phases
GAng	14	11	Nongravelly phase: coarse fragment content in surface layer < 20%; mean CF 7% (0-15%); in conjunction with sombric (a) variant and deep (d), paralithic (pl), shallow lithic (l), and very shallow lithic (sl) phases
GAsl	84	69	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 34 cm (10-50 cm); also in conjunction with sombric (a) variant, bouldery (b), nongravelly (ng), sandy (sa), and very gravelly (vg) phases
GAvg	59	48	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 61% (50-85%); in conjunction with deep (d), shallow lithic (l), and very shallow lithic (sl) phases

Note: There is also a very limited occurrence of Galiano soils with sandy (sa) phase.

Similar soils

Galiano soils are often found together with the well-drained, channery and flaggy, sandy loam to loamy sand textured Saturna soils that have developed on colluvial and glacial drift materials over sandstone bedrock within 100 cm of the surface. Both soils occur on similar slopes and in similar landscape positions. Commonly, because of the intermixing of bedrock types, Galiano and Saturna soils occur so closely together in the landscape that they cannot be reasonably separated. Where this mixing occurs, both soils are identified and mapped as Haslam soil complex (HA).

Natural vegetation

The natural vegetation consists of coast Douglas fir, some scattered Pacific madrone, and occasionally some western red cedar. The ground cover includes stunted salal, grasses, and moss.

Land use

In only a few instances in the survey area, Galiano soils have been cleared for pasture and hay crops and for sheep grazing. Galiano soils are generally unsuitable for agriculture because of steep topography, stoniness, shallow to bedrock, droughtiness, low fertility, and the frequency of bedrock outcrops. The best use for Galiano soils is for growing coniferous trees.

Map units

Galiano soils occur as the dominant soil in the following three map units: the Galiano (GA) simple map unit, the Galiano-Mexicana (GA-ME), and the Galiano-Qualicum (GA-QU) compound map units. Galiano soils are also a major component of the Haslam (HA) soil complex. In addition, Galiano soils occur as a minor soil or unmentioned inclusion in some delineations of the Beddis (BD), Pender Island (PD), Qualicum (QU), Rock (RO), Rock - Pender Island (RO-PD), Rock-Saturna (RO-ST), Salalakim (SL), Saturna (ST), Saturna-Qualicum (ST-QU), Tolmie (TL), and Trincomali (TR) map units.

Galiano map unit (GA)

The Galiano map unit consists dominantly (91%; 60-100%) of well-drained Galiano soil. The Galiano map unit includes on average 9% (up to 40%) of shale or siltstone bedrock (RO) or other soils, of which bedrock outcrops are the most widely occurring inclusion. Unmentioned inclusions of other soils occur sparsely.

Bedrock exposures are usually associated with the very shallow lithic Galiano soils (GAsl) and are a limiting factor for use interpretations. Inclusions of other soils are nonlimiting and are most commonly associated with the GA delineations.

Landform and occurrence

Soils of map unit occur in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls having a wide variety of slopes ranging in steepness from 6 to 70%, or more. The GAsl delineations are generally found in rocky areas with very strong to steep slopes (31-70% or more), whereas the GA delinations are more restricted to gently, moderately, and strongly sloping (6-30%) landscape positions. Inclusions of Rock and other soils occur as small areas at random. Soils of this map unit occur at all elevations.

Distribution and extent

The Galiano map unit is a major map unit. It was mapped as 122 small- to large-sized, long, narrow delineations throughout the survey area. GAsl delineations (55) occur more widely than either GAsl,vg (25), GA (22), or GAl (10) delineations. The Galiano map unit represents an area of 1128 ha (11% of total map area).

Galiano-Mexicana map unit (GA-ME)

This map unit consists dominantly (50-75%) of the well-drained Galiano soil with a subdominant proportion (25-50%) of moderately well- to imperfectly drained, loam to sandy loam textured soils developed on morainal deposits (15-25% coarse fragments) over compact, unweathered till within 100 cm (Mexicana soil). The map unit also contains up to 10% inclusions of bedrock outcrops (RO) or Beddis soils. Neither Mexicana nor Beddis soils limit the use interpretations for the Ga-ME map unit, in fact they somewhat enhance the possibilities.

Landform and occurrence

Soils of this map unit occur in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls with strong to extreme sloping (16-70%) topography. Mexicana soils occupy benchlike and side-slope landscape positions and isolated pockets where till deposits have been left undisturbed. They occur commonly in areas too small to map separately although, collectively, they make up a significant (25-50%) proportion of the map unit. Rock outcrops occur along ridge or knoll crests.

Distribution and extent

The Galiano-Mexicana map unit is a very minor one, occurring as three medium-sized, long, narrow delineations of areas controlled by the underlying bedrock and the former movement of glacial ice. All delineations were mapped as GAsl-ME. They have been mapped only in the Mount Menzies upland area of North Pender Island and in the northern part of South Pender Island. This map unit represents an area of 62 ha (0.6% of total map area).

Galiano-Qualicum map unit (GA-QU)

This map unit consists dominantly (60%; 50-70%) of the well-drained Galiano soil with a subdominant proportion (33%; 30-35%) of rapidly to moderately well-drained, deep (>150 cm), sandy loam to sand textured soils developed on glaciofluvial, fluvial, or marine deposits with 20-50% coarse fragments (Qualicum soils). The Galiano-Qualicum map unit includes on average 7% (up to 20%) of other soils or shale or siltstone bedrock outcrops. The Qualicum soils or other soil inclusions do not limit the use interpretations for the GA-QU map unit.

Landform and occurrence

Soils of this map unit occur on gently to steeply sloping (6-30%) and, in a few places, very strongly sloping (31-45%), subdued and hummocky terrain. Qualicum soils occur on the side-slope positions as deep beach gravels, terraces, or outwash deposits and in areas in between ridges occupied by Galiano soils. The soil inclusions occur scattered within the Qualicum landscape position. Rock outcrops occur along ridge or knoll crests.

Distribution and extent

The Galiano-Qualicum map unit is a very minor one, occurring as five small- to medium-sized delineations. It is mapped only on Mayne and Saturna islands. On Mayne Island two delineations occur in the vicinity of Horton Bay and one occurs near Bennett Bay. The two delineations on Saturna Island occur in the vicinity of Winter Cove. The delineations were mapped as follows: GA-QU1, GA-QUsl, GAsl-QU, GAsl-QUvg, and GAsl,vg-QU. This map unit represents an area of 53 ha (<0.5% of total map area).

HASLAM SOIL COMPLEX AND MAP UNITS

Haslam soil complex (HA)

The Haslam soil complex consists of well-drained soils that range in texture from channery and shaly sandy loam to channery and shaly loam colluvial, residual, and glacial drift materials over sandstone, siltstone, or shale bedrock within 100 cm of the surface. The soil materials usually have a layer of fractured bedrock (paralithic) between the solum and the unweathered, solid bedrock. Coarse fragment content is between 20 and 50%, often exceeding 50% in the subsoil. The different bedrock types occur either sequentially or intermixed. Consequently, Haslam is a complex of Galiano and Saturna soils.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	48	30	70	7
Depth to bedrock (cm)	48	30	70	7
Depth to restricting layer (cm)	48	30	70	7
Depth to mottles (cm)	160	160	160	9
CF content surface layer (%)	50	40	60	4
Fine gravel (shaly and channery) content surface layer (%)	20	10	35	4
Coarse gravel (shaly and channery) content surface layer (%)	23	15	25	4
Cobble content (flaggy) surface layer (%)	8	0	20	4

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	L(50), SL(50)	6
Texture of subsurface layer	-	0
Drainage class	Well(100)	9
Soil classification	O.DYB(100)	9
Type of restricting layer	Sandstone or shale bedrock	
Perviousness	Rapid to moderate	

Water regime

Haslam soil complex consists of well-drained soils. They are moist and occasionally wet during the winter months, but they become droughty during the summer. Water tables do not remain within 100 cm of the surface for any prolonged period. During and shortly after wet periods, water may flow laterally through the saturated subsoil on top of sloping bedrock. The fractured bedrock materials on top of the unweathered, consolidated bedrock do not impede the movement of water.

Variability

Soil phase or variant	Frequency (no.)	Frequency (%)	Description of variability
HAl	2	25	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 68 cm (65-70 cm); also in conjunction with very gravelly (vg) phase
HAsl	5	63	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 39 cm (30-50 cm); also in conjunction with very gravelly (vg) phase

HAvg	5	63	Very gravelly phase: coarse fragment content in surface layers >50%; mean CF 58% (55-60 cm); in conjunction with shallow lithic (l) and very shallow lithic (sl) phases

Note: There is also a very limited occurrence of the deep (d) phase of the Haslam soil complex.

Similar soils

Haslam is a complex of Galiano and Saturna soils in which their respective bedrock types are so intimately intermixed that it is impractical to map them separately.

Natural vegetation

The natural vegetation on the Haslam soil complex consists of coast Douglas fir, Pacific madrone, and, occasionally, western red cedar, western hemlock, and grand fir. The ground cover consists of stunted salal, western bracken, dull Oregon-grape, and grasses.

Land use

The Haslam soil complex is rarely used for agriculture because of many limiting factors, such as steep topography, stoniness, shallow to bedrock, droughtiness, low fertility, and the frequency of rock outcrops. The best use for the Haslam soil complex is for growing coniferous trees.

Map units

The Haslam soil complex is dominant in the simple Haslam (HA) map unit and in the compound Haslam-Qualicum (HA-QU) map unit.

Haslam map unit (HA)

The Haslam map unit consists dominantly (75-100%) of the well-drained Haslam soil complex with up to 25% of bedrock exposures (Rock). Unmentioned inclusions of other soils occur in very few places. The inclusions of bedrock exposures are almost always associated with the very shallow, lithic, Haslam soils (HAsl), and are a limiting factor in use interpretations for the HAsl delineations. Inclusions of other soils, almost always associated with the Haslam (HA) delineations, do not limit the use interpretations of the HA map unit.

Landform and occurrence

Soils of the Haslam map unit occur in areas with shallow soils over sedimentary bedrock on elongated parallel ridges and knolls having a wide variety of slopes ranging in steepness from 6 to 70%, or more. The different types of bedrock (sandstone, shale, and siltstone) occur either sequentially or intermixed. HAsl-delineated soils are generally found in rocky areas on the steeper sloping landscapes (31-70%) of ridged topography. Bedrock inclusions outcrop on the ridge and knoll crests. HA delineations occur on moderately to strongly sloping, benchlike landscape positions (10-30% slopes). The Haslam map unit seldom occurs at elevations exceeding 100 m above mean sea level.

Distribution and extent

The Haslam map unit is a minor one. It has been mapped as 14 medium- to large-sized delineations. Eleven delineations occur on North and South Pender islands. The HAsl delineations occur much more frequently (10) than do the HAl and HA delineations. The Haslam map unit represents an area of 155 ha (1.5% of total map area).

Haslam-Qualicum map unit (HA-QU)

The Haslam-Qualicum map unit consists dominantly (50-75%) of the well-drained Haslam soil complex with a subdominant proportion (25-50%) of rapidly to moderately well-drained, deep (>150 cm), sandy loam to sand textured soils developed on glaciofluvial, fluvial, or marine deposits with 20-50% coarse fragments (Qualicum soils). The Qualicum soils do not limit the use interpretations of this map unit. The map unit also contains some minor inclusions (up to 20%) of bedrock exposures (RO).

Landform and occurrence

Soils of this map unit occur in landscape positions that are characterized by ridges and knolls with shallow soils over sandstone, siltstone, and shale bedrock (Haslam) on gently to strongly sloping (6-30%), subdued and hummocky topography. The Qualicum soils occur on the side-slope positions as deep beach gravels, terraces, or outwash deposits, often associated with major drainageways. They occur, in many places, as relatively minor areas within the Haslam landscape in such a way that they could not be reasonably separated from the Haslam soil complex into two individual map units.

Distribution and extent

The HA-QU map unit is a very minor one in the survey area with four medium-sized delineations on North and South Pender islands only. Two delineations occur in the upland area around Little Bay and one occurs at Hay Point on South Pender Island; one delineation is mapped on North Pender Island. Three delineations were mapped as HAsl-QU and one as HAsl-QUid. This map unit represents an area of 35 ha (0.3% of total map area).

METCHOSIN SOILS AND MAP UNITS

Metchosin soils (MT)

Metchosin soils are very poorly drained Organic soils that have developed on deep (>160 cm) deposits of black, humic, well-decomposed peat materials, composed mainly of sedge and woody plant remains. The soils are stone free.

The profile description and analyses of a selected Metchosin soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface tier (cm)	40	40	40	38
Depth to bedrock (cm)	160	160	160	38
Depth to restricting layer (cm)	160	160	160	22
Depth to mottles (cm)	160	160	160	22
CF content surface tier (%)	0	0	0	38
Fine gravel content surface tier (%)	0	0	0	38
Coarse gravel content surface tier (%)	0	0	0	38
Cobble content surface tier (%)	0	0	0	38
CF content subsurface tiers (%)	0	0	5	38
Fine gravel content subsurface tiers (%)	0	0	0	38
Coarse gravel content subsurface tiers (%)	0	0	0	38
Cobble content subsurface tiers (%)	0	0	0	38

	Frequency of occurrence (%)	No. of observations
Organic material, surface tier (0-40cm)	humic(82), mesic(18)	38
Organic material, middle tier (40-120 cm)	humic(100)	38
Organic material, bottom tier (120-160 cm)	humic(100)	18
Drainage class	Very poor(97), poor(3)	38
Soil classification	T.H(42), TY.H(40), LM.H(16), TME.H(2)	38
Type of restricting layer	Absent	
Perviousness	Moderate to slow	

Water regime

Metchosin soils are very poorly drained. They are the wettest soils found in the survey area. The water table remains at, or close to, the surface for most of the year, although it may drop below 50 cm from the surface during late summer (August and September). Because of their low landscape position, Metchosin soils receive large amounts of runoff and seepage water from the surrounding landscape.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
MTde	5	13	Diatomaceous earth phase: diatomaceous earth as a layer or layers >5 cm thick within Organic soil, organic carbon < 17%; also in conjunction with shallow organic (so) and sedimentary peat (sp) phases
MTso	16	42	Shallow organic phase: thickness of organic materials 40-160 cm over mineral soil; mean thickness 91 cm (40-140 cm); also in conjunction with diatomaceous earth (de) and sedimentary peat (sp) phases
MTsp	7	18	Sedimentary peat phase: sedimentary peat as a layer or layers >5 cm thick in Organic soil, with an organic carbon >17%; also in conjunction with diatomaceous earth (de) and shallow organic (so) phases

Note: There is also a very limited occurrence of the taxonomy change (t) variant, used when significantly thick fibric and mesic peat or limnic materials were found in the soil profile.

Similar soils

Metchosin soils are the only Organic soils recognized in the survey area. They occur together with the poorly drained, fine-textured Cowichan and Tolmie soils in similar landscape positions.

Natural vegetation

The natural vegetation consists of sedges, grasses, rushes, scattered willow (Salix spp.), and hardhack.

Land use

The only limited agricultural uses of Metchosin soils in the survey area are for pasture and production of hay. Most of these soils are left undisturbed. When adequately drained, they can provide one of the best soils for vegetable production. The production of berry crops (blueberries and cranberries) is also reasonable on these soils. Metchosin soils are very strongly acid (pH 4.5-5.0) to strongly acid (pH 5.0-5.5) and need applications of lime, phosphorus, and potassium fertilizers to improve crop production.

When exposed by tillage, sedimentary peat and diatomaceous earth close to the surface can cause management problems. Upon drying, these materials form clods that are difficult to re-wet and breakdown.

Map units

Metchosin soils only occur as the dominant soil in the Metchosin (MT) simple map unit, which includes the following soil phases: MTso, MTsp, and MTde. In addition, Metchosin soils also occur as a minor soil or unmentioned inclusion in some delineations of the Brigantine-Tolmie (BE-TL), Crofton (CF), and Parksville-Tolmie (PA-TL) map units.

Metchosin map unit (MT)

The Metchosin (MT) map unit consists dominantly (92%; 80-100%) of very poorly drained, deep (>160 cm) Metchosin soil. Peaty phases of Tolmie and Crofton soils occur as inclusions in a very few places.

Landform and occurrence

Soils of the Metchosin map unit occur in level to slightly depressional basins with slopes varying from 0 to 1%. In the upland areas they occur as many small, wet areas between bedrock ridges. Inclusions of shallow-phase Metchosin soil (MTso) or peaty-phase mineral soil are located at the periphery of some delineations. Soils of this map unit occur at all elevations.

Distribution and extent

The Metchosin map unit occurs as 37 small and very small delineations throughout the survey area, except on Prevost and Tumbo islands. There are 11 Metchosin delineations mapped as MTso. Only a few delineations were recognized as MTt, MTsp, and MTde. All other delineations were mapped as MT. Collectively, they represent an area of 51 ha, (0.5% of total map area).

MEXICANA SOILS AND MAP UNITS

Mexicana soils (ME)

Mexicana soils are moderately well- to imperfectly drained soils that have developed on loam to sandy loam textured morainic deposits over deep, compact, unweathered till within 100 cm of the surface. Coarse fragment content is generally between 15 and 25%. The unweathered till materials have generally less than 20% clay content (loam texture) and usually occur below 50 cm in depth. These are the only till materials recognized in the survey area. Mexicana soils may have a coarse-textured, marine or fluvial capping from 0 to 30 cm thick with a coarse fragment content of between 20 and 50%. The profile description and analyses of a selected Mexicana profile are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	56	25	100	36
Depth to bedrock (cm)	160	160	160	35
Depth to restricting layer (cm)	56	25	100	36
Depth to mottles (cm)	152	65	160	23
CF content surface layer (%)	18	0	40	25
Fine gravel content surface layer (%)	9	5	15	25
Coarse gravel content surface layer (%)	6	0	10	25
Cobble content surface layer (%)	2	0	20	25
CF content subsurface layer (%)	14	5	35	5
Fine gravel content subsurface layer (%)	12	5	30	5
Coarse gravel content subsurface layer (%)	2	0	5	5
Cobble content subsurface layer (%)	0	0	0	5

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	L(64), SL(36)	25
Texture of subsurface layer (till)	L(80), LS(20)	5
Drainage class	Moderately well(76), imperfect(12), well(8), poor(4)	25
Soil classification	O.DYB(80), O.SB(12), GL.DYB(8)	25
Type of restricting layer	Compact till	
Perviousness	Slow	

Water regime

Mexicana soils are generally moderately well drained with faint mottling throughout the solum, often increasing to distinct mottles below 50 cm from the surface. They are wet during the winter months but are dry and droughty during the summer. Perched water table conditions often occur on top of the compact till, and seepage water is common. Water moves laterally over the compact till both during the winter and after heavy rainfall. The till, when dry, is impervious to water and root growth. During the wetter part of the year, the top 10-15 cm of the unweathered till becomes somewhat pervious.

Variability

Phases of Mexicana soil have very limited occurrences. Those which occur are: sombric (a), and taxonomy change (t) variants, and deep (d), imperfectly drained (id), and shallow lithic (l) phases. Discontinuous, weakly, or, in some places, moderately cemented horizons may be present in the Mexicana soils.

Similar soils

Mexicana soils are similar to the moderately well- to imperfectly drained Trincomali soils that have a gravelly sandy loam to gravelly loamy sand textured overlay of between 30 and 100 cm thick over similar textured compact till. The unweathered compact till of Mexicana soils is also found in the subsoil of the St. Mary soil.

Natural vegetation

The natural vegetation of the Mexicana soils consists of coast Douglas fir, western red cedar, and grand fir. The understory consists of salal, western sword fern, huckleberry, and dull Oregon-grape.

Land use

Little agricultural development has taken place on the Mexicana soils. Clearings are small, scattered, and used only for hay and pasture. The major limitations for agricultural use are the droughtiness, topography, and stoniness. Mexicana soils on slopes not exceeding 15% could be improved with irrigation and stone picking to support a small range of annual crops. Tree fruits and berries seem to do well on these soils under irrigation. Mexicana soils are also good for growing coniferous trees.

Map units

Mexicana soils are the dominant soil in the Mexicana (ME) map unit and the subdominant soil in the Galiano-Mexicana (GA-ME) map unit. In addition, Mexicana soils occur as a minor soil or unmentioned inclusions in some delineations of the Brigantine (BE), Galiano (GA), Galiano-Qualicum (GA-QU),Qualicum (QU), Rock (RO), Rock - Pender Island (RO-PD), Rock-Salalakim (RO-SL), Rock-Saturna (RO-ST), Salalakim (SL), Saturna (ST), St. Mary (SM), and Trincomali (TR) map units.

Mexicana map unit (ME)

The Mexicana map unit consists dominantly (80-100%) of the moderately well- to imperfectly drained Mexicana soil with up to 20% of similar soils with a shallow gravelly sandy loam or gravelly loamy sand marine or fluvial capping from 0 to 30 cm thick with 20-50% coarse fragments. This coarser-textured capping does not limit the use interpretations of the ME map unit.

Landform and occurrence

Soils of the Mexicana map unit occur on moderately to strongly sloping (10-30%), subdued and hummocky terrain and on very strong slopes (31-45%) in upland areas. Soils of this map unit commonly occur as depressions and hollows on side slopes, where till deposits have been protected from erosional processes since the last glaciation. Scattered marine or fluvial cappings occur. Soils of this map unit occur at all elevations.

Distribution and extent

The Mexicana map unit occurs only as a minor map unit on North and South Pender islands with 10 small delineations. One delineation was mapped as MEid. The Mexicana map unit represents an area of 37 ha (0.4% of total map area).

NEPTUNE SOIL AND MAP UNIT

Neptune soil (NT)

Neptune soil is well-drained, black, calcareous, anthropogenic soil consisting of shallow (<100 cm) gravelly sandy loam to gravelly sand, marine deposits mixed with clam and oyster shells, organic debris, and in some places, human artifacts (Indian middens) over sandy marine deposits. Coarse fragment content is between 15 and 35%. The soil has no profile development.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	90	90	90	1
Depth to bedrock (cm)	160	160	160	1
Depth to restricting layer (cm)	160	160	160	1
Depth to mottles (cm)	160	160	160	1
CF content surface layer (%)	40	40	40	1
Fine gravel content surface layer (%)	30	30	30	1
Coarse gravel content surface layer (%)	10	10	10	1
Cobble content surface layer (%)	0	0	0	1
CF content subsurface layer (%)	-	-	-	0
Fine gravel content subsurface layer (%)	-	-	-	0
Coarse gravel content subsurface layer (%)	-	-	-	0
Cobble content subsurface layer (%)	-	-	-	0

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(100)	1
Texture of subsurface layer	-	0
Drainage class	Well(100)	1
Soil classification	O.HR(100)	1
Type of restricting layer	Absent	
Perviousness	Rapid to moderate	

Water regime

Neptune soil is moist during winter but very droughty during summer months. No mottles are discernible within 120 cm of the surface.

Variability

Although the texture of the Neptune soil is very uniform, the coarse fragment content and quantity of shells varies considerably. Neptune soil may overlie coarse-textured marine materials. The high calcium carbonate content from the shells prevents any significant profile development, as indicated by the absence of a B horizon.

Similar soils

Because of its uniqueness, Neptune soil is not related to any other soils.

Natural vegetation

The natural vegetation consists of grasses and scattered coast Douglas fir.

Land use

Neptune soil is of more interest archaeologically than agriculturally. In the survey area, this soil is sometimes used for gardening, as it is calcareous and very high in organic matter and nitrogen content. A major limitation is droughtiness and stoniness.

Map unit

The Neptune soil only occurs as the dominant soil in the Neptune (NT) map unit.

Neptune map unit (NT)

The Neptune map unit consists purely (100%) of the Neptune soil.

Landform and occurrence

Soil of the Neptune map unit occurs as narrow, discontinuous deposits along the seashore on nearly level to very gently sloping (0.5-5%) topography.

Distribution and extent

The Neptune map unit is a very minor one, occurring as six small, narrow delineations. The Neptune map unit represents an area of 4 ha (<0.1% of total map area). Many more, but smaller, unmappable areas with Neptune soil are indicated with the on-site symbol Ⓝ

PARKSVILLE SOILS AND MAP UNITS

Parksville soils (PA)

Parksville soils are poorly drained soils that have between 30 and 100 cm of a sandy loam to loamy sand overlay of marine or fluvial origin over deep (>100 cm), silty clay loam to silty clay textured marine deposits that are usually stone free. The coarse fragment content of the overlay materials is <20%. The profile description and analyses of a selected Parksville soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	53	20	100	28
Thickness of 2nd layer (cm)	42	10	105	116
Depth to bedrock (cm)	160	160	160	127
Depth to restricting layer (cm)	64	30	100	116
Depth to mottles (cm)	29	0	50	127
Depth to PSD (cm)	64	30	100	107
CF content surface layer (%)	6	0	30	109
Fine gravel content surface layer (%)	4	0	20	109
Coarse gravel content surface layer (%)	2	0	10	109
Cobble content surface layer (%)	1	0	20	109
CF content 2nd layer (%)	6	0	55	127
Fine gravel content 2nd layer (%)	4	0	40	127
Coarse gravel content 2nd layer (%)	2	0	20	127
Cobble content 2nd layer (%)	0	0	15	127
CF content 3rd layer (%)	1	0	30	127
Fine gravel content 3rd layer (%)	1	0	15	127
Coarse gravel content 3rd layer (%)	0	0	15	127
Cobble content 3rd layer (%)	0	0	0	127

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	L(38), SL(27), SIL(27), PEAT(6), LS(2)	127
Texture of 2nd layer	SL(56), SICL(22), LS(11), S(3), L(2) SIL(2), SCL(2), CL(2)	127
Texture of 3rd layer	SICL(50), SIC(22), SCL(11), CL(8), SL(7) L(1), SIL(1)	95
Texture of 4th layer (occurs when layer 3 is SL)	SICL(67), SCL(33)	6
Drainage class	Poor(98), very poor(2)	127
Soil classification	O.HG(98), O.G(2)	127
Type of restricting layer	Fine-textured subsoil, often massive structured	
Perviousness	Slow	

Water regime

Parksville soils are poorly drained soils with distinct to prominent mottles within 50 cm of the surface. They are saturated with water to within 30 cm of the surface from late fall to spring. During the summer, the water table drops to below 60 cm, allowing the surface horizons to become dry. Perched water tables occur on top of the fine-textured, massive-structured subsoil. As a result of their landscape position, Parksville soils receive seepage and runoff water from surrounding areas, which keeps the subsoil moist during dry periods.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
PAd	12	9	Deep phase: depth to finer-textured subsoil 100-150 cm; mean depth 121 cm (105-150 cm); also in conjunction with loam (lo), gravelly (g), and silt loam (si) phases
PAg	17	13	Gravelly phase: coarse fragment content in surface layer 20-50%; mean CF 26% (20-40%); also in conjunction with deep (d), loam (lo), and silt loam (si) phases
PAlo	48	38	Loam phase: surface texture is loam; mean thickness 23 cm (5-40 cm); also in conjunction with deep (d), gravelly (g), and peaty (pt) phases
PApt	8	6	Peaty phase: <40 cm of mesic or humic organic materials over mineral soil; mean thickness 17 cm (5-29 cm); also in conjunction with loam (lo) and silt loam (si) phases and taxonomy change (t) variant
PAsi	34	27	Silt loam phase: surface texture is silt loam; mean thickness 25 cm (7-55 cm); also in conjunction with deep (d), gravelly (g), diatomaceous earth (de), and peaty (pt) phases and taxonomy change (t) variant

Note: Other phases of the Parksville soil with very limited occurrence are: diatomaceous earth (de) phase and taxonomy change (t) variant.

Similar soils

The imperfectly drained member of the Parksville soils is the Brigantine soil. Parksville soils differ from the poorly drained Tolmie soils in having coarse-textured overlay materials thicker than 30 cm. Also Tolmie soils are usually saturated with water for more of the year. Where the Parksville soils have a loam or silt loam texture (PAlo, PAsi), there is a layer of coarse-textured materials thicker than 30 cm over the finer-textured materials.

Natural vegetation

The natural vegetation on Parksville soils consists of western red cedar, red alder, hardhack, and some willow. The understory consists of western sword fern, common horsetail, and American vanilla leaf. American skunk cabbage often occurs in the wettest portions that have an organic surface layer (Oh).

Land use

Most of the Parksville soils in the survey area have been cleared for agriculture, primarily for pasture and hay production. The major limitation for growing a wider range of crops is the wetness in the late spring caused by high water tables, which could be overcome with artificial drainage. The upper, coarse-textured horizons have a moderately low moisture-holding capacity and would benefit from irrigation during the summer months. The soils are strongly acid (pH 5.1-5.5) at the surface and moderately acid (pH 5.6-6.0) in the subsurface.

Map units

Two map units occur in the survey area in which Parksville soils are dominant; the simple map unit Parksville (PA) and the compound map unit Parksville-Tolmie (PA-TL). In addition, Parksville is a minor soil in the Brigantine (BE) map unit, which is discussed under Brigantine (BE). Parksville soils also occur as a minor soil or unmentioned inclusion in some delineations of the Brigantine-Tolmie (BE-TL), Cowichan (CO), and Tolmie (TL) map units.

Parksville map unit (PA)

The Parksville map unit consists dominantly (88%; 70-100%) of poorly drained Parksville soil. The Parksville map unit includes on average 12% (up to 30%) of other soils, of which the Brigantine (BE) soil is the most commonly occurring minor soil. A few unmentioned inclusions of other soils occur. The minor soil and inclusions are not limiting the use interpretations for the map unit.

Landform and occurrence

The Parksville map unit occurs on nearly level to gently sloping (0.5-9%) topography in depressional areas, swales, and drainageways. Parksville and Brigantine soils commonly occur together around the periphery of marine basins where sandy materials have been deposited either on top of fine-textured marine materials or as fluvial deposits in drainageways. Brigantine soils are found in the better-drained landscape positions. Brigantine soils occur as unmappable inclusions in the Parksville map unit. This map unit is also found in depressional areas in between bedrock ridges. Elevation is usually between 0 and 100 m above mean sea level.

Distribution and extent

The Parksville map unit occurs throughout the survey area; 27 small- to medium-sized, mostly narrow delineations were mapped and 1 large-sized delineation on Mayne Island. Several Parksville delineations have loam textured surface horizons (PAlo) and silt loam textured surface horizons (PAsi). Other variations in the delineations were mapped as follows: 1 as PAd; 1 as PAd,g; 1 as PAd,si; 3 as PAg,lo; and 1 as PApt. This map unit represents an area of 194 ha (1.9% of total map area).

Parksville-Tolmie map unit (PA-TL)

The Parksville-Tolmie map unit consists dominantly (55%; 50-75%) of the poorly drained Parksville soil with a subdominant proportion (37%; 25-50%) of poorly drained soils developed on deep (>100 cm) loam to silty clay textured, usually stone free, marine deposits (Tolmie soils). In a few places, Tolmie soils are dominant (50%) and the Parksville soils are subdominant (35-45%) in this map unit. The Parksville-Tolmie map unit includes on average 8% (up to 25%) of other minor soils, which are one or a combination of the following two soils: Brigantine (BE) and Cowichan (CO) of which Brigantine occurs most widely. Unmentioned inclusions of other soils occur in some locations. Tolmie soils, minor soils, and soil inclusions do not adversely affect the use interpretations for the PA-TL map unit.

Landform and occurrence

Soils of the Parksville-Tolmie (PA-TL) map unit occur on nearly level to gently sloping (0.5-9%) topography in depressional areas, swales, and drainageways at elevations between 0 and 100 m above mean sea level. The subdominant Tolmie soils, as significant portions of the map unit and the inclusions of Cowichan soils occupy many of the lowest landscape positions. However, they are scattered within the map unit in such a way that they cannot be mapped separately. Brigantine soils occupy the better-drained landscape positions.

Distribution and extent

The Parksville-Tolmie map unit occurs throughout the survey area. It was mapped as 40 medium to small, often long and narrow delineations. About 45% of the PA-TL delineations occur as PAlo-TL, about 15% occur as PAsi-TL and PAg-TL, and another 8% as PApt-TL. This map unit represents an area of 477 ha (4.6% of total map area).

PENDER ISLAND SOIL COMPLEX AND MAP UNITS

Pender Island soil complex (PD)

The Pender Island soil complex consists of well- to rapidly drained, channery and gravelly, sandy loam textured soils that have developed on colluvial and glacial drift materials over sandstone or conglomerate bedrock within 100 cm of the surface. Coarse fragment content is between 20 and 50%. The different bedrock types occur either sequentially or intermixed. Pender Island is a complex of Saturna and Salalakim soils.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	43	15	70	22
Depth to bedrock (cm)	46	15	100	21
Depth to restricting layer (cm)	47	20	100	21
Depth to mottles (cm)	160	160	160	22
CF content surface layer (%)	42	30	50	5
Fine gravel (channery) content surface layer (%)	18	10	25	5
Coarse gravel (channery) content surface layer (%)	16	5	25	5
Cobble content (flaggy) surface layer (%)	8	0	20	5
CF content subsurface layer (%)	35	35	35	1
Fine gravel (channery) content subsurface layer (%)	25	25	25	1
Coarse gravel (channery) content subsurface layer (%)	5	5	5	1
Cobble content (flaggy) subsurface layer (%)	5	5	5	1

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(80), LS(10), L(10)	23
Texture of subsurface layer	SL(100)	1
Drainage class	Well(91), rapid(9)	27
Soil classification	O.DYB(92), O.HFP(4), O.SB(4)	27
Type of restricting layer	Sandstone or conglomerate bedrock	
Perviousness	Rapid	

Water regime

Pender Island soil complex consists of well- to rapidly drained soils. They are moist and occasionally wet during the winter months, but droughty during the summer. Water tables do not remain within 100 cm of the surface for any prolonged periods. During and shortly after wet periods, water may flow laterally through the saturated subsoil on top of sloping bedrock.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
PDl	4	14	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 74 cm (55-100 cm); also in conjunction with very gravelly (vg) phase
PDsl	24	83	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 39 cm (20-50 cm) also in conjunction with very gravelly (vg) phase and sombric (a) and taxonomy change (t) variants
PDvg	8	28	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 63% (55-75%); also in conjunction with sombric (a) and taxonomy change (t) variants, and with shallow lithic (l) and very shallow lithic (sl) phases

Note: There are also very limited occurrences of the sombric (a) and taxonomy change (t) variants and the deep (d) and loam (lo) phases.

Similar soils

Pender Island is a complex of Saturna and Salalakim soils in which their respective bedrock types are so intimately intermixed that it is impractical to map them separately.

Natural vegetation

The natural vegetation on the Pender Island soil complex consists of coast Douglas fir and Pacific madrone with some western red cedar, western hemlock, and grand fir. The ground cover consists of stunted salal, western bracken, dull Oregon-grape, and grasses.

Land use

The Pender Island soil complex is rarely used for agriculture, because of many limiting factors, such as steep topography, stoniness, shallow to bedrock, droughtiness, low fertility, and the frequency of rock outcrops. The best use for Pender Island soils is for growing coniferous trees.

Map units

The Pender Island soil complex is dominant in the Pender Island (PD) map unit and is subdominant in the compound map unit Rock - Pender Island (RO-PD), which is described under Rock (RO).

Pender Island map unit (PD)

The Pender Island map unit consists dominantly (75-100%) of the well-drained Pender Island soil complex with up to 25% inclusions of sandstone and conglomerate bedrock exposures (RO). Unmentioned inclusions of other soils occur in a very few places. Inclusions of bedrock exposures are a limiting factor in use interpretations for this map unit.

Landform and occurrence

Soils of the Pender Island map unit occur in areas with shallow soils over sedimentary bedrock on elongated, parallel ridges and knolls having a wide variety of slopes ranging from 10 to 70%, and more. The different types of bedrock (conglomerate and sandstone) occur either sequentially or intermixed. The bedrock outcrops are generally found on ridge crests. The soil inclusions occur on side-slope positions and in isolated pockets.

Distribution and extent

Pender Island is a minor map unit. It occurs as 11 medium- to small-sized delineations, 8 of which are on North and South Pender islands. The Pender Island map unit consists of only PDs1 delineations. It represents an area of 151 ha (1.5% of total map area).

QUALICUM SOILS AND MAP UNITS

Qualicum soils (QU)

Qualicum soils are rapidly to moderately well-drained soils developed on deep (>150 cm) deposits of gravelly sandy loam to gravelly sand textured, glaciofluvial, fluvial, or marine deposits. Coarse fragment content throughout the profile is between 20 and 70%, but not exceeding 50% in the surface layer. The profile description and analyses of a selected Qualicum soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	91	15	160	139
Depth to bedrock (cm)	160	160	160	90
Depth to restricting layer (cm)	160	160	160	90
Depth to mottles (cm)	155	100	160	128
CF content surface layer (%)	38	25	45	53
Fine gravel content surface layer (%)	19	5	40	53
Coarse gravel content surface layer (%)	13	0	20	53
Cobble content surface layer (%)	7	0	15	53
CF content subsurface layer (%)	32	5	70	33

Fine gravel content subsurface layer (%)	20	2	50	33
Coarse gravel content subsurface layer (%)	9	0	25	33
Cobble content subsurface layer (%)	4	0	40	33

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	LS(47), SL(37), S(12), L(4)	139
Texture of subsurface layer	LS(46), SL(30), S(24)	46
Drainage class	Rapid(42), well(41), moderately well(11), imperfect(5), poor(1)	139
Soil classification	O.DYB(80), O.SB(13), GL.SB(5), GL.DYB(1), O.HG(1)	139
Type of restricting layer	Absent	
Perviousness	Rapid	

Water regime

Qualicum soils are rapidly to moderately well-drained soils. They are moist from late fall to spring but quickly become very droughty during summer. The water table remains well below 100 cm throughout the year.

Variability

Soil phase or variant	Frequency (no.)	Frequency (%)	Description of variability
QUa	25	18	Sombric variant: Ah or Ap horizon >10 cm; also in conjunction with deep (d), imperfectly drained (id), poorly drained (pd), shallow (s), and very gravelly (vg) phases
QUd	7	5	Deep phase: less deep (100-150 cm) than specified over similar materials but with <20% coarse fragment 150 cm; mean depth 111 cm (100-125 cm); mean CF subsoil 1% (0-5%); also in conjunction with sombric (a) variant and loam (lo) and very gravelly (vg) phases
QUid	6	4	Imperfectly drained phase: moisture regime wetter than specified (Gleyed subgroups) for soil; also in conjunction with sombric (a) variant and shallow lithic (l), shallow (s), and very shallow (vs) phases
QUl	16	12	Shallow lithic phase: bedrock at 50-100 cm; mean depth 84 cm (55-100 cm); also in conjunction with imperfectly drained (id), poorly drained (pd), shallow (s), and very gravelly (vg) phases

QUs	17	12	Shallow phase: less deep (50-100 cm) than specified over similar materials but with coarse fragment content < 20%; mean depth 72 cm (50-90 cm); mean total CF 9% (0-35%); mean course gravels and cobbles 1% (0-5%); also in conjunction with sombric (a) variant and imperfectly drained (id) and very gravelly (vg) phases
QUvg	79	57	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 59% (50-75%); also in conjunction with sombric (a) and taxonomy change (t) variants and shallow lithic (l), deep (d), shallow (s), and loam (lo) phases
QUvs	4	3	Very shallow phase: less deep (30-50 cm) than specified over similar materials but with coarse fragment content < 20%; mean depth 39 cm (30-45 cm); mean CF 2% (0-10%); also in conjunction with imperfectly drained (id) phase

Note: Other phases of the Qualicum soil with very limited occurrences are: bouldery (b), loam (lo), poorly drained (pd), and silt loam (si) phases and taxonomy change (t) variant.

Similar soils

Qualicum soils often occur together with similar drained and textured soils that have a much lower (< 20%) coarse fragment content (Beddis soils). Qualicum soils also occur with similar textured but moderately well- to imperfectly drained and shallow (< 100 cm) soils over compact, unweathered till (Trincomali soils). Qualicum soils are better drained and have a much greater coarse fragment content than Baynes soils.

Natural vegetation

The natural vegetation on the Qualicum soils is coast Douglas fir, grand fir, and, occasionally, shore pine and scattered Pacific madrone. Shore pine is the dominant species after fires have occurred. The groundcover consists mainly of stunted salal and western bracken.

Land use

Small areas of Qualicum soils in the survey area are used as pasture land. The major limitations that preclude more intensive agricultural development on these soils are the topography, droughtiness, and stoniness. Also, it is an infertile soil, low in nutrients and organic matter. However, with irrigation these soils could grow productive fruit trees. Qualicum soils are used most extensively as sources of sand and gravel for road building and construction purposes (for example, concrete). All abandoned and currently active gravel pits occur in areas with Qualicum soils. The location of these gravel pits are indicated as G on the soil map.

Map units

Qualicum soils occur in different map units. They are the dominant soils in the Qualicum (QU) map unit. Qualicum soils are the subdominant component in the Galiano-Qualicum (GA-QU), Haslam-Qualicum (HA-QU), and Saturna-Qualicum (ST-QU) map units. In addition, Qualicum soils occur as a minor soil or unmentioned inclusion in some delineations of the Baynes (BY), Beddis (BD), Brigantine (BE), Galiano (GA), Pender Island (PD), Rock-Bellhouse (RO-BH), Rock-Saturna (RO-ST), Salalakim (SL), Saturna (ST), and Trincomali (TR) map units.

Qualicum map unit (QU)

The Qualicum map unit consists dominantly (87%; 55-100%) of the rapidly to moderately well-drained Qualicum soil. The Qualicum map unit includes on average 13% (up to 45%) of unmentioned inclusions of other soils in a few delineations.

Landform and occurrence

Soils of the Qualicum map unit occur as deep outwash (deltaic) and terrace deposits associated with old drainageways and as beach deposits on very gently to very strongly sloping (2-45%) landscape positions. Inclusions of other soils occur at a few locations.

Distribution and extent

The Qualicum map unit is a major one that occurs throughout the survey area. Of 87 small- to large-sized delineations, 17 were mapped as QUvg, 7 as QUa, 7 as QUs, 3 as QUd, 3 as QUl, 5 as QUvg,a; 2 as QUs,vg; 2 as QUs,a; and 1 each as QUd,a; QUid,a; QUl,id; QUl,b; QUl,s; and QUs,id. All other delineations were mapped as QU. This map unit represents an area of 412 ha (4.0% of total map area).

ROCK AS NONSOIL AND MAP UNITS

Rock as nonsoil (RO)

Rock as nonsoil consists of undifferentiated consolidated bedrock exposed or covered by mineral soil less than 10 cm thick over bedrock. It is also called Rock land or Rock outcrop.

Natural vegetation

The natural vegetation consists of mosses, grasses, spring flowers, and, occasionally, broad-leaved stonecrop (*Sedum spathulifolium*), scattered dwarf coast Douglas fir, and Pacific madrone.

Map units

Because many large areas in the survey area consist of bedrock exposures with shallow soils over bedrock, bedrock exposures (RO) occur in many map units. Rock is the dominant (65-100%) component in the simple Rock (RO) map unit. Rock is also the dominant (40-70%) component in four compound map units: Rock-Bellhouse (RO-BH), Rock - Pender Island (RO-PD), Rock-Salalakim (RO-SL), and Rock-Saturna (RO-ST). Each of these map units is described here. In addition, bedrock exposures (RO) also occur as minor component soils or unmentioned inclusions in some delineations of the Brigantine (BE), Fairbridge (FB), Galiano (GA), Galiano-Mexicana (GA-ME), Galiano-Qualicum (GA-QU), Haslam (HA), Haslam-Qualicum (HA-QU), Pender Island (PD), Qualicum (QU), Salalakim (SL), Saturna (ST), Saturna-Qualicum (ST-QU), and Trincomali (TR) map units.

Rock map unit (RO)

The Rock map unit consists dominantly (83%; 65-100%) of undifferentiated bedrock exposed or covered by less than 10 cm of mineral soil and includes on average 17% (up to 35%) of well-drained soils developed on shallow, loamy sand to loam textured, colluvial and glacial drift materials over bedrock, usually within 50 cm of the surface. The coarse fragment content of the soil materials is between 20 and 50%. The kind of soil depends on the bedrock type on which it has developed: BH on sandstone, GA on shale or siltstone, HA on intermixed sandstone and shale or siltstone, PD on intermixed sandstone and conglomerate, SL on conglomerate, and ST on sandstone. The inclusions of soil enhance the use interpretations for this map unit.

Landform and occurrence

The landscape represented by this map unit varies considerably in steepness and in surface expression. It includes areas with smooth, unweathered sedimentary bedrock with very gentle to moderate slopes (2-15%) and strong to very strong slopes (16-45%), rock ridges and rocky knolls (slopes 10-70%), and rock bluffs, cliffs, and escarpments with steep to very steep slopes (71->100%) on all rock types found on the islands. Minor areas of soil occur in places where the bedrock has been fractured and weathered, often indicated by clumps of tree growth. This map unit occurs at all elevations and aspects.

Distribution and extent

Rock is a major map unit throughout the survey area. It occurs as 75 medium-sized delineations throughout the islands. This map unit includes many small islets off the seacoast. The Rock map unit represents an area of 600 ha (5.8% of total map area).

Rock-Bellhouse map unit (RO-BH)

The Rock-Bellhouse map unit consists dominantly (57%; 50-60%) of sandstone bedrock exposed or covered by less than 10 cm of mineral soil. This map unit also contains subdominant proportions (41%; 40-45%) of well-drained soils developed on very shallow (10-50 cm), channery, sandy loam textured, colluvial and glacial drift materials over sandstone bedrock. These soils have an Ah horizon >10 cm (very shallow lithic Bellhouse soil, BHsl). Unmentioned inclusions of other soils occur in a very few places. Bellhouse soils enhance the use interpretations for this map unit.

Landform and occurrence

Materials of the Rock-Bellhouse map unit occur on south-facing rock ridges in hummocky and steep terrain (bluffs, cliffs, escarpments). Slopes commonly range from 16 to 100%. The Bellhouse soils occur on the colluvial side slopes and in some pockets where the bedrock has been fractured and weathered.

Distribution and extent

This Rock-Bellhouse map unit is a very minor one and occurs as three medium-sized delineations on North Pender Island (George Hill area) and as five medium- to large-sized delineations on Saturna Island (Elliott Bluff, Mount Fisher, Mount Warburton Pike, and East Point). Four delineations were mapped as RO-BHsl and four were mapped as RO-BHsl,vg. This map unit represents 258 ha (2.5% of total map area).

Rock - Pender Island map unit (RO-PD)

This map unit consists dominantly (51%, 40-65%) of sandstone and conglomerate bedrock exposed or covered by less than 10 cm of mineral soil. There is a subdominant proportion (49%; 35-60%) of channery and gravelly sandy loam, colluvial and glacial drift materials over sandstone or conglomerate bedrock within 100 cm of the surface (Pender Island soil complex). Unmentioned inclusions of other soils occur in a very few places. Pender Island soil complex enhances the use interpretations for this map unit.

Landform and occurrence

Materials of the Rock - Pender Island map unit occur on rock ridges (10-70% slopes) and in hummocky and steeper sloping terrain (71-100%). The Pender Island soil complex occurs on the colluvial side slopes and in pockets where the bedrock is fractured and weathered. Isolated pockets of the other soil inclusions occur at random.

Distribution and extent

The Rock - Pender Island map unit is a very minor one. It occurs as three medium- to large-sized delineations in the Mount Norman and Spalding Hill upland areas on South Pender Island. It also occurs as six medium- to large-sized delineations on Acland and Secret islands off Prevost Island and in the upland area between Glenthorne Point and Point Liddell on Prevost Island. Eight of the nine delineations were mapped as RO-PDsl and one as RO-PD. This map unit represents an area of 138 ha (1.3% of total map area).

Rock-Salalakim map unit (RO-SL)

This map unit consists dominantly (58%; 40-65%) of conglomerate bedrock exposed or covered by less than 10 cm of mineral soil. The map unit also contains subdominant proportions (40%; 35-60%) of well- to rapidly drained soils developed on gravelly sandy loam textured colluvial and glacial drift materials over conglomerate bedrock within 100 cm of the surface (Salalakim soils). Soils have between 20 and 50% gravels. Unmentioned inclusions of other soils occur in a very few places. Salalakim soils and soil inclusions enhance the use interpretations for this map unit.

Landform and occurrence

Materials of the Rock-Salalakim map unit occur on conglomerate rock ridges, rocky knolls, and in steep terrain with bluffs and cliffs with slopes between 16 and 100%. Salalakim soils (SLsl) occupy the colluvial side slopes and areas where bedrock has been fractured and weathered, commonly as pockets on top of, or in between, the knolls and ridges. The inclusions of other soils occur scattered in pockets and on the side slopes. These materials occur at all elevations.

Distribution and extent

This map unit occurs on Mayne, Prevost, and Pender islands only. Of 34 medium to large delineations that have been mapped, 26 have been mapped as RO-SLsl, 3 as RO-SLsl,vg; 2 as RO-SLsl,a; and 3 as RO-SLvg. This map unit represents an area of 451 ha (4.4% of total map area).

Rock-Saturna map unit (RO-ST)

This map unit consists dominantly (56%; 45-70%) of sandstone bedrock exposed or covered by less than 10 cm of mineral soil. This map unit also contains subdominant proportions (41%; 30-55%) of well-drained soils developed on shallow (10-50 cm), channery, sandy loam textured, colluvial and glacial drift materials over sandstone bedrock (very shallow lithic Saturna soil, STsl). Soils have between 20 and 50% coarse fragments. Unmentioned inclusions of other soils occur in a very few places. Saturna and other soils enhance the use interpretations for this map unit.

Landform and occurrence

Materials of the Rock-Saturna map unit occur dominantly on rock ridges and knolls (slopes 10-70%) and in areas with smooth, unweathered sandstone (slopes 10-45%), or occasionally on steeper landscape positions (bluffs, cliffs, escarpments) with slopes of 46-100%. Saturna soils (STsl) occur on colluvial side slopes and in areas where bedrock has been fractured and weathered, often as pockets on top of, or in between, the ridges or knolls. Inclusions of other soils occur scattered on the side slopes. These materials occur at all elevations.

Distribution and extent

Rock-Saturna is a major map unit. It has been mapped as 83 medium- to large-sized delineations throughout the survey area. Most of the delineations (53) were mapped as RO-STsl. Another 26 delineations were mapped as RO-STsl,vg. One delineation was mapped as RO-STsl,pl and RO-STsl,b; and two as RO-ST. This map unit represents an area of 1137 ha (11.1% of total map area).

SALALAKIM SOILS AND MAP UNITS

Salalakim soils (SL)

Salalakim soils are well- to rapidly drained, gravelly sandy loam textured soils that have developed on shallow colluvial and glacial drift materials of weathered conglomerate over conglomerate bedrock. Depth to bedrock varies between 10 and 100 cm. Coarse fragment content is between 20 and 50%. The profile description and analyses of a selected Salalakim soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	43	15	100	53
Depth to bedrock (cm)	46	13	100	53
Depth to restricting layer (cm)	44	13	100	53
Depth to mottles (cm)	160	160	160	53
CF content surface layer (%)	33	20	45	9
Fine gravel content surface layer (%)	11	5	35	9
Coarse gravel content surface layer (%)	13	5	20	9
Cobble content surface layer (%)	9	3	20	9

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(94), LS(4), L(2)	53
Texture of subsurface layer	-	0
Drainage class	Well(94), rapid(6)	53
Soil classification	O.DYB(89), O.SB(11)	53
Type of restricting layer	Conglomerate bedrock	
Perviousness	Rapid	

Water regime

Salalakim soils are well- to rapidly drained soils. They remain moist throughout the winter but are droughty from late spring to late fall. During or shortly after wet periods water may move laterally through the subsoil on top of the sloping bedrock.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
SLl	13	25	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 71 cm (50-100 cm); also in conjunction with the very gravelly (vg) phase and sombric (a) variant
SLsl	40	75	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 36 cm (13-50 cm); also in conjunction with the bouldery (b) and very gravelly (vg) phases and sombric (a) variant
SLvg	43	81	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 61% (50-75%); in conjunction with the shallow lithic (l) and very shallow lithic (sl) phases and sombric (a) variant

Note: Other variants and phases of the Salalakim soil with very limited occurrence are: sombric (a) variant and bouldery (b) phase.

Similar soils

Salalakim soils are similar in drainage and texture to Qualicum soils, which are much deeper (>150 cm). Also, the coarse fragments (gravel and cobbles) in the Salalakim soils are dominantly rounded (pebbles), whereas the coarse fragments in the Qualicum soils are rounded, subrounded, and, in some places, irregularly shaped.

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, and some grand fir. The understory consists of salal, common gorse, and grasses.

Land use

The use of the Salalakim soils in the survey area is restricted to its natural vegetation. The only potential agricultural use is for sheep grazing in areas dominated by grasses. Salalakim soils and conglomerate bedrock are occasionally used as sources of gravel for road building and construction purposes.

Map units

Salalakim soils occur as the dominant soil in the Salalakim (SL) simple map unit and are a major portion of the Pender Island map unit (PD). They are also a subdominant component in the Rock-Salalakim (RO-SL) map unit, and in the Rock - Pender Island (RO-PD) map unit, which have been described previously. In addition, Salalakim soils occur as a minor soil or unmentioned inclusion in some delineations of the Qualicum (QU), Rock (RO), Rock-Saturna (RO-ST), Saturna (ST), and Trincomali (TR) map units.

Salalakim map unit (SL)

The Salalakim map unit consists dominantly (83%; 70-95%) of the well- to rapidly drained Salalakim soil, with bedrock occurring within 100 cm but most often within 50 cm from the surface (SLsl). The map unit includes on average 17% (up to 30%) bedrock exposures (RO), which is a limiting factor in the use interpretations for this map unit. Nonlimiting inclusions of other soils also occur in a very few places.

Landform and occurrence

Most of the Salalakim delineations (83%) are mapped as SLsl, which occurs dominantly on steep conglomerate rock ridges (slopes 30-100%). The Salalakim soils occupy the colluvial side slopes, with bedrock exposures usually occurring on top of the ridges and knolls. The inclusions of other soils occur as a few pockets on the side slopes.

Distribution and extent

Soils of the Salalakim map unit have been mapped as 30 variable-sized, often long and narrow delineations throughout the survey area, except on Saturna Island. Most delineations have been mapped as SLsl, whereas only a few delineations were mapped as SLvg; SLsl,vg; SLl; SLsl,b; and SL. This map unit represents 298 ha (2.9% of total map area).

SATURNA SOILS AND MAP UNITS

Saturna soils (ST)

Saturna soils are well-drained soils that have developed on shallow deposits of channery, sandy loam textured, colluvial and glacial drift materials over sandstone bedrock within 100 cm of the surface. Coarse fragment content varies between 20 and 50%. The profile description and analyses of a selected Saturna soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	48	12	97	239
Depth to bedrock (cm)	50	12	97	239
Depth to restricting layer (cm)	56	12	97	239
Depth to mottles (cm)	160	160	160	258
CF content surface layer (%)	42	20	50	97
Fine gravel (channery) content surface layer (%)	17	5	30	97
Coarse gravel (channery) content surface layer (%)	18	5	45	97
Cobble content (flaggy) surface layer (%)	8	0	50	97
CF content subsurface layer (%)	52	35	70	7
Fine gravel (channery) content subsurface layer (%)	26	15	35	7
Coarse gravel (channery) content subsurface layer (%)	17	5	30	7
Cobble content (flaggy) subsurface layer (%)	9	0	30	7

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(96), LS(3), L(1)	258
Texture of subsurface layer	SL(72), LS(14), L(14)	7
Drainage class	Well(99), moderately well(1)	258
Soil classification	O.DYB(87), O.HFP(11), E.DYB(2)	258
Type of restricting layer	Sandstone bedrock	
Perviousness	Rapid	

Water regime

The Saturna soils are well-drained soils. They are moist from late fall to spring but droughty during summer months. During and shortly after wet periods, water may flow laterally through the saturated subsoil on top of the sloping bedrock.

Variability

Soil phase or variant	Frequency (no.)	Frequency (%)	Description of variability
STb	4	2	Bouldery phase: >50% rock fragments >60 cm in diameter; colluvial toe-slope positions below rock ridges and escarpments; in conjunction with shallow lithic (l) and deep (d) phases

STd	19	7	Deep phase: depth to bedrock 100-160 cm; mean depth 132 cm (105-160 cm); also in conjunction with nongravelly (ng), bouldery (b), and very gravelly (vg) phases
STl	89	34	Shallow lithic phase: depth to bedrock 50-100 cm; mean depth 70 cm (50-97 cm); also in conjunction with nongravelly (ng), paralithic (pl), bouldery (b), and very gravelly (vg) phases and taxonomy change (t) variant
STng	18	7	Nongravelly phase: coarse fragment content in surface layer <20%; mean CF 8% (0-15%); in conjunction with deep (d), shallow lithic (l), and very shallow lithic (sl) phases
STpl	22	9	Paralithic phase: boundary between soil and solid bedrock consists of fractured sandstone rock; mean depth to fractured rock 45 cm (20-70 cm); mean thickness of fractured rock 46 cm (5-90 cm); in conjunction with very shallow lithic (sl) and shallow lithic (l) phases
STsl	148	57	Very shallow lithic phase: depth to bedrock 10-50 cm; mean depth 36 cm (12-50 cm); also in conjunction with nongravelly (ng), paralithic (pl), and very gravelly (vg) phases
STvg	142	55	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 59% (50-80%); in conjunction with deep (d), shallow lithic (l), and very shallow lithic (sl) phases

Note: There is also a very limited occurrence of the taxonomy change (t) variant for the Saturna soil, mainly used when a podzolic B horizon is present.

Similar soils

Saturna soils are similar to the Bellhouse soils, which have a thicker (>10 cm) Ah horizon. Saturna soils are found together with Galiano soils, both occurring on similar slopes and in similar landscape positions. When they cannot be mapped separately because of the intermixing of bedrock types, they have been identified and mapped as Haslam soil complex (HA). Saturna soils are also found together with Salalakim soils, both occurring on similar slopes and in similar landscape positions. When these two soils cannot be mapped separately because of the intermixing of bedrock types, they have been identified and mapped as Pender Island soil complex (PD).

Natural vegetation

The natural vegetation consists of coast Douglas fir, scattered Pacific madrone, and some grand fir. The understory consists of salal, western bracken, and dull Oregon-grape.

Land use

Generally, no agricultural development has taken place on Saturna soils. In areas where the vegetation is dominated by grasses, these soils are used for grazing sheep and cattle. Saturna soils are generally not suitable for the production of annual crops because of steep topography, stoniness, shallow soils over bedrock, droughtiness, low fertility, and the frequency of rock outcrops. Despite these limitations, Saturna soils are used by some islanders to produce vegetables, although only with high monetary inputs and labor-intensive management. Most areas of Saturna soils remain in natural forest of coast Douglas fir and Pacific madrone with an understory of stunted, scattered salal. Tree growth is slow because of the lack of moisture during the summer. Such areas provide browse and protection for deer.

Map units

Saturna soils occur in many map units. It is the dominant soil in the Saturna (ST) simple map unit and in the Saturna-Qualicum (ST-QU) compound map unit. Saturna soils are also major components of the Pender Island (PD) and Haslam (HA) map units both of which have been described previously. Saturna is also a subdominant soil in the Rock-Saturna (RO-ST) and Rock - Pender Island (RO-PD) map units both of which have already been described. In addition, Saturna soils occur as a minor soil or unmentioned inclusion in some delineations of the Beddis (BD), Brigantine-Tolmie (BE-TL), Cowichan (CO), Galiano (GA), Qualicum (QU), Rock (RO), Rock-Salalakim (RO-SL), and Trincomali (TR) map units.

Saturna map unit (ST)

The Saturna (ST) map unit consists dominantly (84%; 60-100%) of well-drained Saturna soil and includes on average 16% (up to 30%) of sandstone bedrock exposures (RO). The bedrock outcrops are usually associated with the very shallow lithic Saturna soil (STsl). Bedrock outcrops are more limiting than the Saturna soils for use interpretations for the map unit. Unmentioned, nonlimiting inclusions of other soils also occur in some delineations of this map unit.

Landform and occurrence

The soil landscape consists of shallow soils over sandstone bedrock on moderately to strongly sloping (10-30%) topography in subdued to hummocky terrain or on very strongly to steeply sloping (31-100%) side slopes of rock ridges. Bedrock exposures occur at random, most frequently in association with the very shallow lithic Saturna soil (STsl). The minor inclusions of other soils occur scattered in isolated pockets.

Distribution and extent

The Saturna map unit is a major unit with 99 delineations, mainly long and narrow and of variable size mapped throughout the survey area. About half of the delineations have been mapped as STsl. On Saturna Island one delineation has been mapped as STd,ng. In one-quarter of the delineations very shallow lithic (STsl) and shallow lithic (STl) Saturna soils occur in about equal proportions. These delineations have been mapped as ST. The remaining delineations had bedrock between 50 and 100 cm (STl). This map unit represents 2878 ha (28% of total map area).

Saturna-Qualicum map unit (ST-QU)

The Saturna-Qualicum map unit consists dominantly (53%; 40-70%) of well-drained Saturna soil. The map unit contains a subdominant component (36%; 30-40%) of rapidly to moderately well-drained, deep (>150 cm), gravelly sandy loam to gravelly sand textured soils developed on glaciofluvial, fluvial, or marine deposits with 20 to 50% coarse fragments (Qualicum soils). In some places Qualicum soils may be dominant and Saturna soils subdominant. This map unit also includes on average 11% (up to 30%) unmentioned inclusions of other soils and bedrock outcrops. Qualicum soil is less limiting than the Saturna soil for use interpretations for this map unit.

Landform and occurrence

The soil landscape consists of subdued, hummocky, and ridged terrain with gentle to strong slopes (6-30%). Qualicum and other soils occupy side-slope positions either as deep beach gravels on terraces or in between ridges as deep outwash or marine deposits. Qualicum soils may also occur as isolated pockets in between the Saturna soils. Rock outcrops occur along ridge or knoll crests.

Distribution and extent

The Saturna-Qualicum map unit is a minor one and is mapped as 10 medium to large delineations in the survey area. Saturna, Prevost, and Mayne islands each have three ST-QU delineations and one occurs on North Pender Island. One large delineation has been mapped on East Point Peninsula on Saturna Island. Seven of the delineations were mapped as ST-QU; one as STl,vg-QU; one as ST-QUvg; one as STvg-QU; and one as STl,vg-QUl,vg. The map unit represents an area of 272 ha (2.6% of total map area).

ST. MARY SOILS AND MAP UNITS

St. Mary soils (SM)

St. Mary soils are imperfectly drained soils with 30-70 cm of a sandy loam to loamy sand textured capping of marine or fluvial deposits over 15-50 cm of loam to silty clay loam textured, usually stone-free, marine deposits underlain by gravelly loam to clay loam textured, unweathered, compact till within 100 cm of the surface. The profile description and analyses of a selected St. Mary soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	25	10	40	2
Thickness of 2nd layer (cm)	28	15	40	2
Depth to bedrock (cm)	160	160	160	2
Depth to restricting layer (cm)	60	55	65	2
Depth to mottles (cm)	63	55	70	2
Depth to 1st PSD (cm)	45	40	50	2
Depth to 2nd PSD (cm)	108	55	160	2
CF content surface layer (%)	55	0	75	2
Fine gravel content surface layer (%)	25	10	40	2
Coarse gravel content surface layer (%)	10	5	15	2
Cobble content surface layer (%)	3	0	5	2
CF content 2nd layer (%)	33	5	60	2
Fine gravel content 2nd layer (%)	15	5	25	2
Coarse gravel content 2nd layer (%)	15	0	30	2
Cobble content 2nd layer (%)	3	0	5	2
CF content 3rd layer (%)	15	10	20	2
Fine gravel content 3rd layer (%)	10	10	10	2
Coarse gravel content 3rd layer (%)	5	0	10	2
Cobble content 3rd layer (%)	0	0	0	2

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(50), L(50)	2
Texture of 2nd layer	L(50), SICL(50)	2
Texture of 3rd layer (till)	L(50), CL(50)	2
Drainage class	Imperfect(100)	2
Soil classification	GL.SB(50), GL.DYB(50)	2
Type of restricting layer	Compact till	
Perviousness	Slow	

Water regime

St. Mary soils are imperfectly drained soils that are saturated to about 60 cm from the surface during winter and early spring. The soil receives seepage and runoff water from surrounding upland areas, which maintains the subsoil in a moist condition throughout the summer. Downward movement of water may be restricted by the fine-textured, and, in many places, massive-structured subsoil and deeper by the compact till, which creates perched water table conditions. Faint mottling occurs in the lower part of the solum, with distinct to prominent mottles below 50 cm from the surface.

Variability

The following soil phases were recognized in conjunction with the St. Mary soil: deep (d), gravelly (g), very gravelly (vg), and loam (lo) phases. They occur very infrequently. The till materials are usually weakly cemented but are, in some places, moderately cemented.

Similar soils

Where the fine-textured marine subsoil is missing and the soil is slightly better drained and more gravelly, these soils are mapped as Trincomali (TR). Similar imperfectly drained soils without compact till in the subsoil are mapped as Brigantine (BE) soils. The till materials in the subsoil is the Mexicana-type till.

Natural vegetation

The natural vegetation consists of western red cedar, and red alder, and some bigleaf maple and coast Douglas fir. The understory includes western sword fern, western bracken, and salal.

Land use

Very small areas of the St. Mary soils in the survey area have been cleared from their original vegetation for agricultural use, such as pasture and hay production. These soils are similar to the Brigantine soils, regarding most use interpretations. The St. Mary soils can be improved with irrigation and fertilizer to produce a wide range of agricultural crops and tree fruits. Besides agriculture, growing deciduous trees is another good use for these soils.

Map units

St. Mary soils are the dominant component in the St. Mary (SM) simple map unit. In addition, St. Mary soils occur as a minor soil or unmentioned inclusion in some delineations of the Haslam (HA), Qualicum (QU), and Trincomali (TR) map units.

St. Mary map unit (SM)

The St. Mary map unit consists dominantly (75-100%) of imperfectly drained St. Mary soil with up to 25% of similar soils without the sandy loam to loamy sand textured capping. Mexicana and Trincomali soils also occur as inclusions in some of the delineations. These inclusions are not limiting the use interpretations for this map unit.

Landform and occurrence

Soils of the St. Mary map unit occur on moderately to steeply sloping topography (10-30%) in subdued terrain. The inclusions of Mexicana and Trincomali soils occur at random in some delineations. Elevations are within 100 m of mean sea level.

Location and extent

St. Mary is a very minor unit and occurs as three small delineations on North Pender Island, two of which were mapped as SMg and one as SMd,g. They represent an area of 16 ha (0.2% of total map area).

TOLMIE SOILS AND MAP UNITS

Tolmie soils (TL)

Tolmie soils are poorly drained soils that have developed on deep (>100 cm), loam to silty clay textured, marine deposits that are usually stone free. Sandy loam, loamy sand, and gravelly materials occur in pockets or in a thin layer or layers throughout the soil profile. The profile description and analyses of a selected Tolmie soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	42	7	160	139
Depth to bedrock (cm)	160	160	160	138
Depth to restricting layer (cm)	63	7	160	138
Depth to mottles (cm)	29	5	50	139
CF content surface layer (%)	4	0	20	127
Fine gravel content surface layer (%)	2	0	15	127
Coarse gravel content surface layer (%)	2	0	15	127
Cobble content surface layer (%)	0	0	10	127
CF content subsurface layer (%)	2	0	30	139
Fine gravel content subsurface layer (%)	1	0	25	139
Coarse gravel content subsurface layer (%)	0	0	10	139
Cobble content subsurface layer (%)	0	0	5	139

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	L(35), SIL(26), Peat(14), SICL(13), CL(7), SCL(2), SL(2), SIC(1)	139
Texture of 2nd layer	SICL(40), SL(19), SCL(13), CL(9), SIC(8), L(7), SIL(3), LS(1)	116
Texture of 3rd layer	SICL(43), SIC(22), SL(19), CL(7), L(5), LS(2), SCL(2)	58
Drainage class	Poor(94), very poor(6)	139
Soil classification	O.HG(89), HU.LG(7), O.G(3), R.HG(1)	139
Type of restricting layer	Fine-textured subsoil, commonly massive structured	
Perviousness	Slow	

Water regime

Tolmie soils are poorly drained soils that have distinct to prominent mottles within 50 cm of the surface. They are wet for long periods throughout the year with water tables within 30 cm of the surface from late November to early March. In spring, water tables drop quickly and remain below 50 cm from May to October. Water tables fluctuate rapidly in response to wetness and dryness. Perched water tables can occur temporarily on top of a massive-structured, fine-textured subsoil. The Tolmie soils receive runoff water from the surroundings as a result of their low landscape position.

Variability

Soil phase or variant	Frequency (no.)	(%)	Description of variability
TLg	13	9	Gravelly phase: coarse fragment content in surface layer 20-50%; mean CF 27% (20-40%); also in conjunction with taxonomy change (t) variant
TLpt	20	14	Peaty phase: <40 cm of mesic or humic organic materials over mineral soil; mean thickness 20 cm (10-40 cm); also in conjunction with taxonomy change (t) variant
TLt	8	6	Taxonomy change variant: taxonomy differs from specified classification (Orthic Humic Gleysol); also in conjunction with gravelly (g) and peaty (pt) phases

Note: There is also a very limited occurrence of the shallow lithic (l) phase of the Tolmie soil.

Similar soils

Tolmie and Cowichan soils are similar. The Cowichan soils are also poorly drained, silt loam to silty clay loam textured, marine soils. They have a more uniform and often finer texture than Tolmie soils. Tolmie soils differ from Parksville soils by having a thinner (<30 cm) sandy overlay or thinner (<30 cm) sandy layer underlying a loam or silt loam surface layer if present.

Natural vegetation

The natural vegetation on Tolmie soils consists of western red cedar, red alder, and bigleaf maple. The understory includes salmonberry, western sword fern, sedges, horsetail, western bracken, and, in the wettest places, commonly American skunk cabbage.

Land use

Most Tolmie soils in the survey area have been cleared for agricultural production. When drainage is improved, they are some of the best agricultural soils. The surface soil is well supplied with organic matter and nitrogen. The soil is strongly to moderately acid (pH 5.1-6.0) and responds favorably to fertilizers. The unimproved agricultural land use is usually pasture and hay crops, as spring planting of other crops is often impractical because of wet soil conditions.

Map units

Tolmie soils are dominant in the Tolmie (TL) simple map unit. Tolmie is a subdominant soil in the Brigantine-Tolmie (BE-TL) and Parksville-Tolmie (PA-TL) compound map units that have been described under BE and PA. In addition, Tolmie soils occur as a minor soil or unmentioned inclusion in some delineations of the Cowichan (CO), Crofton (CF), Fairbridge (FB), and Metchosin (MT) map units.

Tolmie map unit (TL)

The Tolmie map unit consists dominantly (84%; 50-100%) of the poorly drained Tolmie soil. The Tolmie map unit includes on average 16% (up to 50%) of other soils (Parksville, Crofton, and Brigantine) of which the Parksville (PA) soil occurs most frequently. Unmentioned inclusions of other soils occur in very few places. These other soils do not limit the use interpretations for the Tolmie map unit.

Landform and occurrence

The Tolmie landscape consists of depressions, basins, swales, and drainageways with nearly level to gently sloping (0.5-9%) topography, in which the Parksville, Cowichan, and Crofton soils occur in some places. The Brigantine soils occur in the better-drained landscape positions.

Distribution and extent

The Tolmie map unit is a major one in the survey area, with 76 small- to medium-sized, usually narrow and long delineations. Of these, 61 delineations were mapped as TL, 12 have peaty overlay materials (TLpt), and 3 have between 20 and 50% coarse fragments in the surface (TLg). The map unit represents an area of 297 ha (2.9% of total map area).

TRINCOMALI SOILS AND MAP UNITS

Trincomali soils (TR)

Trincomali soils are moderately well- to imperfectly drained soils that have developed on shallow (30-100 cm) deposits of gravelly sandy loam to gravelly loamy sand textured, marine, fluvial, or glaciofluvial materials (15-50% gravels) over gravelly loam to sandy loam textured, unweathered, compact till within 100 cm of the surface. The profile description and analyses of a selected Trincomali soil are given in Appendixes 1 and 2.

Soil characteristics

Characteristic	Mean	Minimum	Maximum	No. of observations
Thickness of surface layer (cm)	59	20	100	33
Depth to bedrock (cm)	160	160	160	21
Depth to restricting layer (cm)	71	40	100	21
Depth to mottles (cm)	136	55	160	34
CF content surface layer (%)	31	5	50	23
Fine gravel content surface layer (%)	15	5	25	23
Coarse gravel content surface layer (%)	11	0	25	23
Cobble content surface layer (%)	6	0	30	23
CF content subsurface layer (%)	11	0	50	34
Fine gravel content subsurface layer (%)	6	0	20	34
Coarse gravel content subsurface layer (%)	4	0	20	34
Cobble content subsurface layer (%)	1	0	10	34

	Frequency of occurrence (%)	No. of observations
Texture of surface layer	SL(71), LS(21), S(6), L(2)	34
Texture of subsurface layer (till)	L(82), SL(15), LS(3)	34
Drainage class	Moderately well(68), imperfect(24), well(8)	34
Soil classification	O.DYB(73), GL.DYB(15), O.SB(9), GL.SB(3)	34
Type of restricting layer	Compact till	
Perviousness	Slow	

Water regime

Most Trincomali soils are moderately well drained. After prolonged wetting, perched water table conditions are common on top of the compact till for short periods. Consequently, faint mottling is often found in the lower part of the soil profile directly above the till. During dry periods in summer the soils are very droughty. Some Trincomali soils are wetter and are imperfectly drained.

Variability

Soil phase or variant	Frequency (no.)	Frequency (%)	Description of variability
TRa	4	11	Sombric variant: Ah or Ap horizon >10 cm; also in conjunction with imperfectly drained (id) and very gravelly (vg) phases

TRd	4	12	Deep phase: depth to compact till 100-150 cm; mean depth 116 cm (110-125 cm); also in conjunction with very gravelly (vg) phase
TRid	8	24	Imperfectly drained phase: wetter moisture regime than specified for soil; also in conjunction with shallow lithic (l) and very gravelly (vg) phases
TRvg	12	35	Very gravelly phase: coarse fragment content in surface layer >50%; mean CF 60% (50-70%); also in conjunction with sombric (a) variant and deep (d), shallow lithic (l), and imperfectly drained (id) phases

Note: There is also a limited occurrence of the shallow lithic (l) phase for the Trincomali soil.

Similar soils

Trincomali soils commonly occur together with Qualicum soils, which are deeper and better drained. Soils with coarse-textured overlays thicker than 150 cm have been mapped as Qualicum soils. Trincomali soils occur in some places together with Mexicana soils that have developed on till without the somewhat coarser-textured overlay materials. Where the sandy loam to loamy sand textured deposits over till are less than 30 cm thick, these soils are part of the Mexicana (ME) map unit. Trincomali soils are similar to St. Mary soils but lack the finer-textured layer above the till.

Natural vegetation

The natural vegetation consists of coast Douglas fir, with some grand fir and scattered Pacific madrone. The understory consists of salal, western bracken, and dull Oregon-grape.

Land use

The present use of the Trincomali soils in the survey area is restricted to its natural vegetation. The main limiting factors for agriculture on these soils are stoniness, droughtiness, and topography. In addition, the soils are very strongly acid to strongly acid (pH 4.6-5.5) and have a low inherent fertility. The best use for these soils is for growing coniferous trees.

Map units

Trincomali soils occur as the dominant soil in the Trincomali (TR) simple map unit. In addition, Trincomali soils occur as a minor soil or unmentioned inclusion in some delineations of the Galiano-Qualicum (GA-QU), Qualicum (QU), Rock - Pender Island (RO-PD), Rock-Saturna (RO-ST), Saturna (ST), and St. Mary (SM) map units.

Trincomali map unit (TR)

The Trincomali (TR) map unit consists dominantly (75%; 60-100%) of the moderately well- to imperfectly drained Trincomali soil. The Trincomali map unit includes on average 25% (up to 40%) of other soils. These other soils may be one or a combination of the following minor soils: Qualicum (QU), Mexicana (ME), or Galiano (GA), of which Qualicum soils occur most commonly. Unmentioned inclusions of other soils also occur in a very few places.

Landform and occurrence

The Trincomali landscape consists of shallow beach, terrace, or outwash deposits over till, usually near or at the shoreline or along drainageways. The Trincomali map unit (TR) occurs on gently to strongly sloping topography (6-30%) but in some places on steeper slopes (31-45%). Qualicum soils occur in scattered locations where the coarse-textured deposits are deeper than 150 cm. Mexicana soils occur in some locales where the coarse-textured overlay is absent. Some minor inclusions of other soils also occur.

Distribution and extent

The Trincomali map unit is a minor one in the survey area with 24 small- to medium-sized delineations, 12 of which were mapped on North and South Pender islands. About half (13) of the delineations were mapped as TR. Two delineations were mapped as TRd; three as TRvg, id; two as TRvg; and one each as TRa, TRid, TRd,vg, and TRd,a. This map unit represents an area of 97 ha (0.9% of total map area).

SUMMARY OF AREAL EXTENT OF MAP UNITS IN THE SURVEY AREA

When the map units are grouped by the origin of parent materials and/or by parent material textures of the dominant soils, some comparisons can be made about the distribution of these groups of map units in the survey area (Table 6).

Table 6. Distribution of map units in survey area by parent material

Dominant soils	Map units	Area occupied				Total distribution in survey area	
		N and S Pender, Prevost islands sheet		Mayne, Saturna islands sheet			
		(ha)	(%)	(ha)	(%)	(ha)	(%)
1 Shallow colluvial and glacial drift over bedrock (within 1 m)	GA, GA-ME, GA-QU, HA, HA-QU, PD, SL, ST, and ST-QU	1555	36	3476	58	5031	49
2 Rock	RO, RO-BH, RO-PD, RO-SL, and RO-ST	1302	30	1282	22	2584	25
3 Shallow, over compact glacial till (within 1 m)	ME, SM, and TR	134	3	16	<1	150	1
4 Deep, moderately fine-textured marine materials	CO, FB, and TL	387	9	144	2	531	5
5 Deep, coarse to moderately coarse textured materials	BD, BY, and QU	163	4	337	6	500	5
6 Coarse to moderatly coarse over deep, moderately fine to fine-textured marine materials	BE, BE-TL, PA, and PA-TL	692	16	614	10	1306	13
7 Fluvial, organic and anthropogenic materials	CF, MT, and NT	22	<1	66	1	88	1
Summary							
1,2,3 Shallow soils and rock		2991	69	4774	80	7765	76
4,5,6,7 Deep soils		1264	29	1161	19	2425	24

Note: The remaining area on each map sheet and for total survey area consists of land types such as CB, MD, TF, and W.

PART 5. LAND USE INTERPRETATIONS

Application of soil survey information is often required by the users of soil maps and reports. Information about soils, therefore, has to be interpreted for different uses. For the Gulf Islands soil survey, the main users are land use planners, for whom two kinds of land use interpretations have been identified:

- land constraints for the absorption of septic tank effluent; and
- land capability for agriculture.

In the following sections these two land use interpretations are described, and the map unit ratings are presented in table format. However, the map unit interpretations in the following tables cannot be regarded as site-specific. Not all the land limitations mentioned in the text or in the tables may be encountered in any particular location. These sections should be used as a guide to the types of limitations (problems) that could be encountered. Whether they will or will not be encountered, and how difficult they may be to overcome in a particular location, must be determined by on-site inspections.

LAND CONSTRAINTS FOR SEPTIC TANK EFFLUENT ABSORPTION

In the survey area, sewage disposal is handled by septic tanks and effluent absorption fields. With increasing pressure for residental development it is important to know the constraints or limitations that the soil and landscape properties of each map unit impose on septic tank effluent absorption. Soil characteristics, more than any other factor, determine the success or failure in the performance of septic tank absorption fields. If an absorption field is to function properly, the soil must do three things: it must first accept the effluent, then treat it, and finally dispose of it.

Interpretations for septic tank effluent absorption are based on a number of soil and landscape properties. Four constraint classes (slight, moderate, severe, and very severe) have been defined to indicate problems or potential problems with effluent absorption that are caused by soil and landscape characteristics (Epp 1984). A rating of slight indicates that the soil is well suited for effluent absorption. As the severity of the constraint class increases from slight to very severe, the design and maintenance requirements for septic tank effluent disposal increase. Soils within a constraint class are similar in the degree of limitations but the kind of limitation (for example, depth to bedrock or drainage) may differ.

For the survey area the following six soil and landscape properties were used to indicate the limitations for septic tank effluent absorption (Epp 1984):

D DEPTH TO RESTRICTED LAYERS: Layers with low permeability near the surface limit the thickness of material available for effluent treatment and may result in saturated conditions in the overlying soil (for example, compact till and massive-structured horizons).

G COARSE FRAGMENT CONTENT: Coarse fragment content reduces the effectiveness of the soil for effluent treatment.

R DEPTH TO BEDROCK: Bedrock near the surface limits the thickness of material available for effluent treatment and may result in saturated conditions in the overlying soil.

S SOIL TEXTURE: Texture is not a major property for determining effluent disposal but rather for determining soil permeability.

T TOPOGRAPHY: Steepness and pattern of slopes limit effluent disposal.

W SOIL DRAINAGE: The rapidity and extent of water removal from the soil in relation to additions is important.

The methods, assumptions, definitions, and symbols for constraint classes and properties used in determining constraints on effluent absorption are defined in MOE Manual 5 (Epp 1984).

The constraint class and soil and landscape limitations for septic tank effluent absorption are listed for each map unit in Table 7. The constraint class is determined by the most limiting soil and landscape property (or properties). These properties are indicated in capital letters behind the constraint class. Also, those limiting properties that occur at the next lower constraint class are indicated by a lowercase letter behind the ones indicated in capital letters. A maximum of three limitations per constraint class are presented in Table 7. The slight constraint class does not list subclass limitations.

The typical constraint classes for effluent absorption in columns 4 and 5 of Table 7 are based on the dominant occurrence of the limiting soil and landscape properties for the map unit as indicated in the map unit legend. Where a range is defined for a given property, for example slope or coarse fragment content, the calculated mean value (from data for Mayne, Saturna, and Prevost islands) is used to determine the typical constraint class. For compound map units the calculated mean proportion of dominant and subdominant soils is used, although for a specific delineation the actual proportions may vary within the limits indicated in the legend. Where inclusions of minor soils have been described, the proportion of the most frequent limiting soil is assumed to be 20%. In some delineations, the proportion of minor soils may vary from this assumed proportion. The different soil proportions within each map unit are represented by superscripts for the ratings in Table 7.

For some delineations the constraint class may differ from the typical constraint class for one or more reasons. For example, slopes may be more or less steep than for the typical rating. Also, the range of slopes occurring in some delineations may span more than one constraint class. Therefore, columns 6, 7, and 8 of Table 7 indicate variations from the typical rating because of changes in slope class. Also the described range in soil properties, such as coarse fragment content, texture, drainage, depth to bedrock, or other restricting layers, may cover more than one constraint class. Variations in soil properties as indicated by the soil phase or variant symbol do occur, such as texture, coarse fragment content, depth to bedrock, or presence of an organic capping. Where the occurrence of a soil phase or variant results in the constraint rating of the map unit being different from the typical rating, this variation, along with the soil phase or variant is indicated in columns 9, 10, and 11 of Table 7. These ratings

Table 7. Constraint classes and soil and landscape limitations for septic tank effluent absorption

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
BD	Beddis	4	Slight^{8}†– † moderate^{2}	GSW^{2}†	3	Slight		BDg	Moderate	G
					5	Moderate	T	BDl	Severe	R
					6	Severe	T			
					7	Very severe	T			
BE	Brigantine	4	Severe^{8}– very severe^{2}	DWs^{8}–Wd^{2}	5	Severe^{8}– very severe^{2}	DWt^{8}–Wd^{2}	BEd		
Severe	Wd				6	Severe^{8}– very severe^{2}	DTW^{8}–Wd^{2}	BEd,g	Severe	Wdg
								BEvg	Severe	DGW
BE-TL	Brigantine–	3,4	Severe^{5}– very severe^{5}	DWs^{5}–Wd^{5}	5	Severe^{5}– very severe^{5}	DWt^{5}–Wd^{5}	BEd,g-TL	very severe^{5}	
Severe^{5}–	Wdg^{5}–Wd^{5} Tolmie									
BY	Baynes	3,4	Severe^{8}– moderate^{2}	W^{8}–GSW^{2}	5	Severe^{8}– moderate^{2}	Wt^{8}–GTW^{2}	BYpd,pt	Very	
severe	W				6	Severe	TW^{8}–Tgw^{2}			
CF	Crofton	3	Very severe	W	4,5	Very severe	W	CFg,id	Severe	Wgt
CO	Cowichan	2,3	Very severe	DWs						
FB	Fairbridge	4	Severe^{8}– very severe^{2}	SW^{8}–DWs^{2}	3,5	Severe^{8}– very severe^{2}	SW^{8}–Ws^{2}			
GA	Galiano	6	Very severe	Rt	4,5	Very severe	R	GAsl,vg	Very severe	
Rgt^{8}–Rt^{2}								GAl	Severe^{8}– very severe^{2}	
RTg^{8}–Rt^{2}										
					7,8,9	Very severe	RT	GAl,vg	Severe^{8}– very severe^{2}	
GRT^{8}–Rt^{2}										

Table 7. Constraint classes and soil and landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
GA-ME	Galiano-Mexicana	6	Severe	RTg^6-DTw^4	5 7	Severe Very severe	Rgt^6-Dtw^4 Tr^6-Td^4	GAsl-ME	Very severe^6-severe^4	Rt^6-DTg^4
GA-QU	Galiano-Qualicum	4	Severe^6-moderate^4	Rg^6-GSW^4	5	Severe^6-moderate^4	Rgt^6-GTW^4	GAsl-QU	Very severe^6-moderate^4	Rt^6-GSW^4
					6	Severe	RTg^6-Tgw^4	GAsl,vg-QU	Very severe^6-moderate^4	Rtg^6-GSW^4
					7	Very severe	Tr^6-T^4	GAsl-QUvg	Very severe^6-severe^4	R^6-Gsw^4
								GA-QUsl	Severe^6-very severe^4	Rg^6-R^4
								GA-QUl	Severe	Rg^6-Rgw^4
HA	Haslam	6	Severe^8-very severe^2	RTg^8-Rt^2	4	Severe^8-very severe^2	Rg^8-R^2	HAsl	Very severe	Rt
					5	Severe^8-very severe^2	Rgt^8-R^2			
					7,8	Very severe	Tr^8-RT^2			
HA-QU	Haslam-Qualicum	5	Very severe^6-moderate^4	R^6-GTW^4	3,4	Very severe^6-moderate^4	R^6-GSW^4	HAsl-QUid	Very severe^6-severe^4	R^6-Wgs^4
					6	Very severe^6-severe^4	Rt^6-Tgw^4			
					8	Very severe	Tr^6-T^4			
ME	Mexicana	6	Severe	DTw	5 7,8	Severe Very severe	Dtw Td	MEid	Severe	DTW
MT	Metchosin	1	Very severe	W				MTso	Very severe	Wd
NT	Neptune	2,3,4	Moderate	GS						

Table 7. Constraint classes and soil and landscape limitations for septic tank effluent absorption (continued)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
PA	Parksville	3,4	Very severe^8-severe^2	Wd^8-DWs^2	5	Very severe^8-severe^2	Wd^8-Dwt^2	PAd	Very severe^8-severe^2	W^8-DWs^2
PA-TL	Parksville-Tolmie	3	Very severe	Wd^6-W^4	4,5	Very severe	Wd^6-W^4			
PD	Pender Island	6	Very severe	Rt	4,5 7,8	Very severe Very severe	R RT	PDsl,vg	Very severe	Rtg
QU	Qualicum	5	Moderate^8-severe^2	GTW^8-Dtw^2	4	Moderate^8-severe^2	GSW^8-Dgw^2	QUid	Severe	Wgt^8-Dtw^2
					6	Severe	Tgw^8-DTw^2	QUl	Severe	Rtw^8-Dtw^2
					7,8	Very severe	T^8-Td^2	QUvg	Severe	Gtw^8-Dtw^2
RO	Rock	7,8,9,10	Very severe	RT	3,4,5 6	Very severe Very severe	R Rt			
RO-BH	Rock-Bellhouse	7,8,9	Very severe	RT	4,5 6	Very severe Very severe	R Rt			
RO-PD	Rock-Pender Island	6	Very severe	Rt	4,5 7,8,9	Very severe Very severe	R RT			
RO-SL	Rock-Salalakim	6	Very severe	Rt	4,5 7,8,9	Very severe Very severe	R RT			
RO-ST	Rock-Saturna	6	Very severe	Rt	3,4,5 7,8,9,10	Very severe Very severe	R RT			

Table 7. Constraint classes and soil and landscape limitations for septic tank effluent absorption (concluded)

Map unit		Typical constraint class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Constraint class (4)	Soil limitations (5)	Slope class* (6)	Constraint class (7)	Soil limitations (8)	Soil phase* (9)	Constraint class (10)	Soil limitations (11)
SL	Salalakim	7,8,9,10	Very severe	RT	3,4,5	Very severe	R			
					6	Very severe	Rt			
SM	St. Mary	4,5	Severe	DW^{8}-DWs^{2}	6	Severe	DTW	SMg	Severe	DWg
ST	Saturna	6	Very severe	Rt	4,5	Very severe	R	STsl,vg	Very severe	Rgt^{8}-Rt^{2}
					7,8,9	Very severe	RT	STl	Severe^{8}-very severe^{2}	RTg^{8}-Rt^{2}
								STl,vg	Severe^{8}-very severe^{2}	GRT^{8}-Rt^{2}
								STd,ng	Severe^{8}-very severe^{2}	Tr^{8}-Rt^{2}
ST-QU	Saturna-Qualicum	6	Very severe^{6}-severe^{4}	Rt^{6}-Tgw^{4}	3,4	Very severe^{6}-moderate^{4}	R^{6}-GSW^{4}	ST-QUvg	Very severe^{6}-severe^{4}	Rt^{6}-GTw^{4}
					5	Very severe^{6}-moderate^{4}	R^{6}-GTW^{4}	STl,vg-QUl	Severe^{9}-very severe^{1}	GRT^{5}-RTg^{4}-RT^{1}
					7	Very severe	RT^{6}-T^{4}	STvg-QU	Very severe^{6}-severe^{4}	GRT^{6}-Tgw^{4}
TL	Tolmie	1,2,3	Very severe	Wd	4,5	Very severe	Wd			
TR	Trincomali	4	Severe^{8}-moderate^{2}	Dwg^{8}-GSW^{2}	3	Severe^{8}-moderate^{2}	Dwg^{8}-GSW^{2}	TRd,vg	Severe^{8}-moderate^{2}	DGw^{8}-GSW^{2}
					5	Severe^{8}-moderate^{2}	Dtw^{8}-GTW^{2}	TRid	Severe^{8}-moderate^{2}	DWg^{8}-GSW^{2}
					6	Severe	DTw^{8}-Tgw^{2}	TRvg	Severe^{8}-moderate^{2}	DGw^{8}-GSW^{2}
					7	Very severe	Td^{8}-T^{2}			

* See map legend.
† Percent soil component (see map legend for inclusions).

assume the same typical slope class (column 4). In addition, inclusions of unmappable (because of the size of the map scale) soils, or variations in the proportion of dominant, subdominant, and minor soils do occur for some delineations. These types of variations could not be expressed in the table.

The ratings in Table 7 are to be used as a guide only. They are not specific to individual map delineations and, therefore, do not eliminate the need for detailed on-site investigations.

Results of Table 7 indicate that only one of the map units for the survey area has a slight constraint rating for effluent absorption. The Beddis (BD) map unit has only slight limitations for effluent absorption for typical map unit conditions. However, Beddis map units consisting of dominantly loamy sand instead of sandy loam soils have moderate limitations for effluent absorption on slopes of less than 10%. Also, the Neptune (NT), Qualicum (QU), Saturna deep (STd), and Trincomali deep (TRd) map units on moderate slopes (10-15%) all have moderate limitations for effluent absorption. All other map units occurring in the survey area, including the foregoing map units on steeper topography (>15%), fall into the severe and very severe constraint classes for septic tank effluent absorption.

LAND CAPABILITY FOR AGRICULTURE

Land in the agricultural land reserve accounts for almost 20% of the total surveyed area. With increasing pressures to use land for purposes other than agriculture (for example, residential development) it is important for planning purposes to know the agricultural capability class for the map units recognized in the survey area. This section evaluates the soil and landscape properties for the map units to determine soil and landscape limitations for agricultural capability.

Land capability ratings for agriculture are interpretations based on climatic, soil, and landscape characteristics. The Land Capability Classification for Agriculture in British Columbia (Kenk and Cotic 1983) groups soils into seven classes on the basis of the range of regionally adapted crops that can be grown and/or the intensity of management inputs required to maintain crop production. Class 1 soils are considered to have no limitations for crop production. As the class level increases from one to seven, the level of management input increases and the range of suitable crops decreases. Class 7 soils are considered to have no potential either for natural grazing or for arable crop production. Soils within a class are similar in the degree of limitation but the kind of limitation may differ. The subclasses indicate the nature of the soil limitations (Kenk and Cotic 1983).

For the survey area, the following six land capability subclasses were used to describe the soil and landscape limitations for agricultural capability:

A SOIL MOISTURE DEFICIENCY: Crops are adversely affected by droughtiness caused by soil and/or climatic characteristics; improvable by irrigation.

D UNDESIRABLE SOIL STRUCTURE AND/OR LOW PERVIOUSNESS: Soils are difficult to till, require special management for seedbed preparation, pose trafficability problems, have insufficent aeration, absorb and distribute water slowly, and/or have the depth of rooting zone restricted by conditions other than high water table, bedrock, or permafrost; improvement practices vary; no improvement is assumed in the absence of local experience.

P STONINESS: Coarse fragments significantly hinder tillage, planting, and harvesting operations; improvable by stone picking.

R DEPTH TO SOLID BEDROCK AND/OR ROCKINESS: Bedrock near the surface and/or rock outcrops restrict rooting depth and cultivation; not improvable.

T TOPOGRAPHY: Steepness or the pattern of slopes limits agricultural use; not improvable.

W EXCESS WATER: Excess free water, other than from flooding, limits agricultural use and may result from poor drainage, high water tables, seepage, and/or runoff from surrounding areas; improvable by drainage; feasibility and level of improvement is assessed on a site-specific basis.

The methods, assumptions, definitions, and symbols for classes and subclasses used in determining the agricultural capability rating are described in MOE Manual 1 (Kenk and Cotic 1983).

In determining the agricultural capability, climatic limitations are evaluated first and, if neither soil nor landscape characteristics produce any limitations, then the regional climate determines the land capability for agriculture.

For the survey area, the climatic moisture deficit (CMD) is the limiting climatic variable for agriculture capability. Potential evaporation data are not available for the survey area. For Saltspring Island, which is nearby in the same climatic regime, the CMD was calculated at 203-234 mm during the growing season (Coligado 1979). This represents a Class 4 climate in the Climatic Capability Classification for Agriculture in British Columbia (Air Studies Branch 1981).

The capability class and soil and landscape limitations (subclasses) for agricultural capability are listed for each map unit in Table 8. The capability class is determined by the most limiting soil and landscape property (or properties). These properties are indicated in capital letters behind the numerical capability class. Also, those limiting properties that occur at the next lower capability class are indicated by a lowercase letter behind the ones indicated in capital letters. A maximum of three limitations per capability class are presented in Table 8.

The typical land capability for agriculture ratings in columns 4 and 5 of Table 8 are based on the dominant occurrence of the limiting soil and landscape properties for each of the map units as indicated in the map legend. Where a range is defined for a given property, for example slope or coarse fragment content, the calculated mean value is used. Column 4 gives the unimproved rating. For some soils, capability can be improved through management practices such as irrigation, drainage, and stone picking, which is indicated by the improved ratings in column 5. For compound map units, calculated means of the proportion of dominant and subdominant soils

Table 8. Land capability ratings for agriculture

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
BD	Beddis	4	$3At^{8}$[†]$-4AP^{2}$[†]	$2AT^{8}-3AP^{2}$	3 5 6 7	$3A^{8}-4AP^{2}$ $3AT^{8}-4APt^{2}$ $4Ta^{8}-4APT^{2}$ 7T	$2A^{8}-3AP^{2}$ $3Ta^{8}-3APT^{2}$ $4T^{8}-4Tap^{2}$ 7T	BDg BDl	$4A^{8}-4AP^{2}$ 3Art	$3At^{8}-3AP^{2}$ 2ART
BE	Brigantine	4	$3At^{8}-4W^{2}$	$2AT^{8}-2ADW^{2}$	3 5 6	$3A^{8}-4W^{2}$ $3AT^{8}-4W^{2}$ $4Ta^{8}-4W^{2}$	$2A^{8}-2ADW^{2}$ $3Ta^{8}-2ADW^{2}$ $4T^{8}-2ADW^{2}$	BEg BEvg	$4Ap^{8}-4W^{2}$ $4AP^{8}-4W^{2}$	$3APt^{8}-2ADW^{2}$ $3APt^{8}-2ADW^{2}$
BE-TL	Brigantine-Tolmie	3	$3A^{5}-4W^{5}$	$2A^{5}-2DW^{5}$	4 5	$3At^{5}-4W^{5}$ $3AT^{5}-4W^{5}$	$2AT^{5}-2DW^{5}$ $3Ta^{5}-2DW^{5}$	BEg-TL	$4Ap^{5}-4W^{5}$	$3APt^{5}-2DW^{5}$
BY	Baynes	4	$3At^{8}-4AP^{2}$	$2AT^{8}-3AP^{2}$	3 5 6	$3A^{8}-4AP^{2}$ $3AT^{8}-4APt^{2}$ $4Ta^{8}-4APT^{2}$	$2A^{8}-3AP^{2}$ $3Ta^{8}-3APT^{2}$ $4T^{8}-4Tap^{2}$	BYpd,pt	$5W^{7}-O5W^{3}$	$3W^{7}-O3W^{3}$
CF	Crofton	3	5W	3W	4 5	5W 5W	3Wt 3TW	CFg,id CFpt	3APT 5W	3PTa 3DW
CO	Cowichan	2,3	4W	2DW	4 5	4W 4Wt	2DTW 3Tdw	COpt COg	5W 4Wp	3DW 2DPW
FB	Fairbridge	4	$3Adt^{8}-4W^{2}$	$2DT^{8}-2DW^{2}$	3 5	$3Ad^{8}-4W^{2}$ $3ATd^{8}-4W^{2}$	$2D^{8}-2DW^{2}$ $3Td^{8}-2DW^{2}$			
GA	Galiano	6	$5T^{8}-7R^{2}$	$5T^{8}-7R^{2}$	4 5 7,8,9	$3APt^{8}-7R^{2}$ $3APT^{8}-7R^{2}$ $7T^{8}-7RT^{2}$	$3Pat^{8}-7R^{2}$ $3PTa^{8}-7R^{2}$ $7T^{8}-7RT^{2}$	GAsl,b GAvg	$7T^{8}-7RT^{2}$ $5Tap^{8}-7R^{2}$	$7T^{8}-7RT^{2}$ $5Tp^{8}-7R^{2}$

Table 8. Land capability ratings for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
GA-ME	Galiano-Mexicana	6	5T	5T	5	3APT^{6}-3ATd^{4}	3PTa^{6}-3Tad^{4}			
					7	7T	7T			
GA-QU	Galiano-Qualicum	4,5	4Tap^{6}-4APT^{4}	4Tp^{6}-4Tap^{4}	6	5T^{6}-5Tap^{4}	5T	GAsl,vg-QU	4APT	4Tap
					7	7T	7T	GAsl-QUvg	4Tap^{6}-4APT^{4}	4Tp^{6}-4PTa^{4}
								GA-QUsl	4Tap^{6}-5Rp+^{4}	4Tp^{6}-5R+^{4}
HA	Haslam	6	5Tp^{8}-7R^{2}	5T^{8}-7R^{2}	4	4Pa^{8}-7R^{2}	4Pa^{8}-7R^{2}	HAsl	5RTp^{8}-7R^{2}	5RT^{8}-7R^{2}
					5	4Pa+^{8}-7R^{2}	4Pa+^{8}-7R^{2}			
					7,8,9	7T^{8}-7RT^{2}	7T^{8}-7RT^{2}			
HA-QU	Haslam-Qualicum	5	4PRa^{6}-4AP+^{4}	4PR+^{6}-3APT^{4}	3	4PRa^{6}-4AP^{4}	4PR^{6}-3AP^{4}			
					4	4PRa^{6}-4AP^{4}	4PR^{6}-3AP+^{4}			
					6	5Tpr^{6}-4APT^{4}	5Tr^{6}-4Tap^{4}			
					8	7T	7T			
ME	Mexicana	6	4Tap	4T	4	3AP+	2APT			
					5	3APT	3Tap			
					7,8	7T	7T			
MT	Metchosin	1	05W	03W	2	05W	03W	MTso	05W	03Wd
NT	Neptune	2	4AP	3AP	3	4AP	3AP			
					4	4AP	3AP+			
					5	4AP+	3APT			

Table 8. Land capability ratings for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
PA	Parksville	3	$4W^8-3A^2$	$2ADW^8-2A^2$	4	$4W^8-3At^2$	$2ADT^8-2AT^2$	PAd	$4W^8-3A^2$	$2AW^8-2A^2$
					5	$4Wt^8-3AT^2$	$3Tad^8-3Ta^2$	PAg, lo	$4PW^8-3A^2$	$3Pdw^8-2A^2$
								PAlo	$4W^8-3A^2$	$2DW^8-2A^2$
								PApt	5W	3Wd
								PAsi	$4W^8-3A^2$	$2DW^8-2A^2$
PA-TL	Parksville-Tolmie	3	4W	$2ADW^6-2DW^4$	4	4W	$2ADT^6-2DTW^4$	PAg-TLg	4PW	3Pdw
					5	4Wt	$3Tad^6-3Tdw^4$	PAg, lo-TLg	4PW	3Pdw
								PAlo-TL	4W	2DW
								PApt-TLpt	5W	3Wd
PD	Pender Island	6	$5RTp^8-7R^2$	$5RT^8-7R^2$	4	$5RP^8-7R^2$	$5Rp^2-7R^2$	PDsl	$5TRp^8-7R^2$	$5TR^8-7R^2$
					5	$5Rpt^8-7R^2$	$5Rt^8-7R^2$			
					7,8	$7T^8-7RT^2$	$7T^8-7RT^2$			
QU	Qualicum	5	4APt	3APT	3	4AP	3AP	QUl	4APT	3APr
					4	4AP	3APt	Qul,b	5PTa	5PTa
					6	4APT	4Tap	Quvg	4APt	4Pat
					7	7T	7T			
RO	Rock	7,8,9,10	7RT	7RT	3,4	$7R^8-5Rap^2$	$7R^8-5Rp^2$			
					5	$7R^8-4Rap^2$	$7R^8-5Rp^2$			
					6	$7R^8-5RTa^2$	$7R^8-5RT^2$			
RO-BH	Rock-Bellhouse	7,8,9	$7RT^6-7T^4$	$7RT^6-7T^4$	4	$7R^6-5R^4$	$7R^6-5R^4$	RO-BHsl,vg	$7R^6-5ARp^4$	$7R^6-5ARp^4$
					5	$7R^6-5R^4$	$7R^6-5R^4$			
					6	$7R^6-5RT^4$	$7R^6-5RT^4$			

Table 8. Land capability ratings for agriculture (continued)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
RO-PD	Rock - Pender Island	6	7R^5-5RTp^5	7R^5-5RTp^5	4,5 7,8,9	7R^5-5Rp^5 7RT^5-7T^5	7R^5-5Rp^5 7RT^5-7T^5	RO-PDsl,vg	7R^5-5ART^5	7R^5-5ART^5
RO-SL	Rock-Salalakim	6	7R^6-5RTp^4	7R^6-5RT^4	4,5 7,8,9	7R^6-5Rap^4 7RT^6-7T^4	7R^6-5R^4 7RT^6-7T^4	RO-SLsl,vg	7R^6-5ART^4	7R^6-5ART^4
RO-ST	Rock-Saturna	6	7R^6-5RTp^4	7R^6-5RTp^4	3,4,5 7,8,9,10	7R^6-5Rap^4 7RT^6-7T^4	7R^6-5Rp^4 7RT^6-7T^4	RO-STsl,vg	7R^6-5ART^4	7R^6-5ART^4
SL	Salalakim	7,8,9,10	7T^8-7RT^2	7T^8-7RT^2	5 6	5Rap^8-7R^2 5RTp^8-7R^2	5Rap^8-7R^2 5RTp^8-7R^2	SLsl SLsl,vg	5RT^8-7R^2 5ART^8-7R^2	5RT^8-7R^2 5ART^8-7R^2
SM	St. Mary	5	3ATd	3Tad^8-3Td^2	4 6	3Adt 4Ta	2ADT^8-2DT^2 4T	SMg	4APt	4Pat
ST	Saturna	6	5Tap^8-7R^2	5Tp^8-7R^2	4 5 7,8,9	4APr^8-7R^2 4APt^8-7R^2 7T^8-7RT^2	4Par^8-7R^2 4PTa^8-7R^2 7T^8-7TR^2	STb STsl STsl,vg STl,vg STd,ng	5PRT^8-7R^2 5RTa^8-7R^2 5ART^8-7R^2 5ATp^8-7R^2 5Ta	5PRT^8-7R^2 5RTp^8-7R^2 5ART^8-7R^2 5ATp^8-7R^2 5T
ST-QU	Saturna-Qualicum	6	5Tap^9-7R^1	5Tp^5-5T^4-7R^1	3 4 5 7	4APr^5-4AP^4-7R^1 4APr^5-4AP^4-7R^1 4APt^9-7R^1 7T^9-7RT^1	4Par^5-3AP^4-7R^1 4Par^5-3APt^4-7R^1 4Pat^5-3APT^4-7R^1 7T^9-7RT^1	ST-QUvg STl,vg-QUl STvg-QU	5Tap^9-7R^1 5ATp^5-5Tap^4-7R^1 5ATp^5-5Tap^4-7R^1	5Tp^9-7R^1 5ATp^5-5Tp^4-7R^1 5ATp^5-5Tp^4-7R^1

Table 8. Land capability ratings for agriculture (concluded)

Map unit		Typical capability class			Variation due to slope			Variation due to soil properties		
Symbol (1)	Name (2)	Slope class* (3)	Unimproved rating (4)	Improved rating (5)	Slope class* (6)	Unimproved rating (7)	Improved rating (8)	Soil phase* (9)	Unimproved rating (10)	Improved rating (11)
TL	Tolmie	1,2,3	4W	2DW	4	4W	2DTW	TLp†	5W	3Wd
					5	4W†	3Tdw	TLg	4PW	3Pdw
TR	Trincomali	4	4AP	3AP†	3	4AP	3AP	TRvg	5Ap	5Ap
					5	4AP†	3APT			
					6	4APT	4Tap			
					7	7T	7T			

* See map legend.

† Percent soil component (see map legend for inclusions).

are used although for a specific delineation the actual proportions may vary within the limits indicated in the legend. Where inclusions of minor soils have been described, the proportion of the most frequent limiting minor soil is assumed to be 20%. In some delineations, the proportion of minor soils may vary from this assumed proportion. For the foregoing two examples, the proportions are represented by superscripts for the ratings in Table 8.

For some delineations, land capability for agriculture may differ from the typical capability rating for one or more reasons. For example, slopes may be more or less steep than for the typical rating. Also, the range of slopes occurring in some delineations may span more than one class of land capability for agriculture. Therefore, columns 6, 7, and 8 of Table 8 indicate the variations from the typical rating because of changes in slope class. Also, the described range in soil properties, such as coarse fragment content, may cover more than one capability class. Variations in soil properties, such as texture, coarse fragment content, depth to bedrock, and presence of an organic capping, do occur for some delineations. These are indicated by the soil phase or variant symbol in the map legend. Where the occurrence of a soil phase or variant results in the land capability for agriculture rating of the map unit being different from the typical rating, this difference, along with the soil phase or variant is indicated in columns 9, 10, and 11 of Table 8. These ratings assume the same typical slope class (column 4). In addition, inclusions of unmappable (because of the size of the map scale) soils, or variations in the proportion of dominant, subdominant, and minor soils do occur for some delineations. These types of variations could not be shown in the table.

The ratings in Table 8 are to be used as a guide only. They are not specific to individual map delineations and, therefore, do not eliminate the need for detailed on-site investigations.

Land capability for agriculture ratings in Table 8 show that soils of map units with the least degree of limitation for agricultural crop production generally occur below the 100-m contour on gently sloping terrain or in valley bottoms. Most of these soils have developed on deep marine deposits with a low content of coarse fragments. Some of these map units represent the following soils: Baynes, Beddis, Brigantine, Crofton, Cowichan, Fairbridge, Parksville, and Tolmie. Similar soils with compact till occurring between 50 and 100 cm from the surface (St. Mary) fall into the same category.

Soils of map units with more severe limitations for agricultural crop production are generally found at higher elevations and on more steeply sloping terrain. Most of these soils are shallow to bedrock or to compact till, because they have developed on colluvial and glacial drift materials. They usually have a high percentage of coarse fragments. The fact that these soils are difficult or impossible to improve realistically is indicated by the improved ratings (Table 8), which are the same as the unimproved ratings. Some of these map units represent the following soils: Bellhouse, Galiano, Haslam complex, Pender Island complex, Salalakim, and Saturna soils. Agricultural uses on these soils are restricted to natural grazing, the production of perennial forage crops, or other specially adapted crops, such as tree fruits and grapes.

PART 6. DERIVED AND INTERPRETIVE MAPS

Besides the map unit interpretations discussed and presented in Part 5 of this report, similar or different interpretations that are specific for map delineations can be made.

Agriculture Canada is able to produce maps based on the soil information. These may be either interpretive maps, such as land capability for agriculture, or maps derived from the original soil information, such as maps of soil texture, slope, or drainage. Such maps can be made because the original boundaries and map unit symbols are stored in a computer as part of the Canada soil information system (CanSIS).

Soil maps are drafted by the Cartography Section in the Land Resource Research Centre of Agriculture Canada, Ottawa. As part of the cartographic procedure, the soil maps are digitized, and the locations of the map unit boundaries and their symbols are entered into the computer. The associated legend is then also stored in the computer. This data base provides the basis for the production of derived or interpretive maps.

For example, it is possible that a map showing only the different types of soil parent materials is required. The procedure involves replacing the original map unit symbol by a new symbol that indicates the type of soil parent material. The same boundaries are retained, with the exception of those that have the same new symbols on either side. In this instance, the boundary is deleted. No new boundaries are added.

If users of the soil information need derived or interpretive maps, they should contact the senior author of this report at British Columbia Land Resource Unit, Agriculture Canada, 6660 N.W. Marine Drive, Vancouver, B.C. V6T 1X2 (Telephone 604-224-4355).

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APPENDIXES

APPENDIX 1. PROFILE DESCRIPTIONS AND ANALYTICAL DATA OF THE SOILS

This appendix is an alphabetical listing of profile descriptions and accompanying analytical data for most soils in the survey area. To best represent typical profiles for the soils mapped in the survey area, selections have also been made from profiles described on adjoining Gulf Islands.

Standard methods of soil analyses (McKeague 1978) were followed in Agriculture Canada's soil survey laboratory in Vancouver, B.C. The relative soil erodibility (K-value) for each horizon was determined, using the methodology described by Wischmeier and Smith (1978).

Profile descriptions and analytical data of the following soils are included:

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BAYNES SOIL

Location: along driveway to Madrona Studio, Mayne Island
Landform: blanket of marine deposits
Topography: very gentle slopes (2%), micromounded topography
Parent materials: deep marine sand deposits
Present land use: forested; coast Douglas fir, red alder, and western sword fern
Remarks: surface horizon (Ah) much deeper than typical Baynes profile (Baynes sombric phase), subsoil (BCg horizon) slightly cemented; generally classified as Gleyed Dystric Brunisol

Longitude: 123°16'10"W
Latitude: 48°51'50"N
Elevation: 10 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 27 cm
Classification: Gleyed Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0–33	very dark gray (10YR 3/1)	very dark grayish brown (10YR 3/2)	sandy loam to loamy sand	weak	medium to coarse	granular	soft	very friable	none	15
Bgj	33–66	grayish brown (10YR 5/2)	light olive brown (2.5YR 5/4)	sand	weak	medium to coarse	subangular blocky	slightly hard	very firm	com., coarse, dist. brown (10YR 4/3)	20
BCg	66–135	light olive brown (2.5YR 5/4)	light olive gray (5Y 6/2)	sand	weak	coarse	angular blocky	hard	very firm	many, coarse, dist. dark y. brown (10YR 4/6)	2
Cg	135–180	light gray (5 Y 7/2)	light brownish gray (2.5Y 6/2)	loamy sand			massive	slightly hard	firm	com., fine, prom. yellowish brown (10YR 4/8)	1

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	4.6	3.7	0.26	14	0.5	0.2	15.5	3.8	0.9	0.1	0.1	32	73	5	20	7	0.14
Bgj	4.9	0.5	0.03	17	0.3	0.2	4.2	1.1	0.2	0.0	0.1	33	88		9	2	0.13
BCg	5.1	0.5	0.02	25			3.6	1.1	0.2	0.0	0.1	37	94		5	1	0.10
Cg	5.4	0.2	0.02	10			3.9	1.7	0.5	0.1	0.1	62	86		5	9	0.14

BEDDIS SOIL

Location: 250 m east of picnic shelter at north end of large field on B.C. Provincial park, Sidney Island
Landform: blanket of marine deposits
Topography: crest of convex, very gentle slopes (4%)
Parent materials: coarse-textured marine deposit
Present land use: forested; primarily coast Douglas fir with understory of salal
Remarks: cut bank along Strait of Georgia side of the park; at 180 cm there is a stone line below which marine clay occurs; in Ah, granules appear to be earthworm fecal pellets; weakly cemented sands in Bcj horizon can be crushed between fingers when dry; blocks disintegrate quickly in water; Cc horizon is moderately cemented

Longitude: 123°19'20"W
Latitude: 48°38'15"N
Elevation: 30 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 110 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth	Color		Texture	Structure			Consistence		Mottles	Coarse frag. (%)
	(cm)	moist	dry		grade	class	kind	moist	wet		
LF	2–0	mat of dead needles and twigs									
Ah	0–5	black (10YR 2/1)	dark grayish brown (10YR 4/2)	loamy sand	strong	medium	granular	very friable	nonsticky nonplastic	none	0
Bm	5–15	dark yellowish brown (10YR 3/4)	brown (10YR 5/3)	loamy sand	weak	fine	granular	very friable	nonsticky nonplastic	none	3
Bfj	15–40	dark yellowish brown (10YR 3/5)	yellowish brown (10YR 5/4)	sand	weak	fine	granular	loose	nonsticky nonplastic	none	5
BC	40–70	olive brown (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	sand	–	–	single grain	loose	nonsticky nonplastic	none	15
Bcj	70–110	dark yellowish brown (10YR 3/6)	brownish yellow (10YR 6/6)	fine sand	–	–	massive	very friable	nonsticky nonplastic	none	0
Cl	110–120	light olive brown (2.5Y 5/4)	light gray (2.5Y 7/2)	fine sand	weak	medium to coarse	pseudo blocky	very friable	nonsticky nonplastic	none	0
Cc	120–145	light olive brown (2.5Y 5/6)	light yellowish brown (2.5Y 6/4)	fine sand	strong	medium to coarse	pseudo blocky	very friable	nonsticky nonplastic	none	0
C2	145–150+	light olive brown (2.5Y 5/4)	light gray to pale yellow (2.5Y 7/3)	fine sand	moderate	medium to coarse	pseudo blocky	very friable	nonsticky nonplastic	none	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos. Fe	Pyrophos. Al	Cation exchange CEC	Ca	Mg	K	Na	Base sat.	Particle size distribution Total sand	Very fine sand	Silt	Clay	Soil erosion
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	5.2	4.6	0.26	18	0.2	0.2	18.4	8.1	2.1	0.5	0.5	61	79	7	16	5	0.11
Bm	4.9	1.5	0.07	20	0.3	0.3	7.0	2.0	0.5	0.1	0.2	40	79	8	19	2	0.13
Bfj	5.1	0.9	0.04	20	0.2	0.2	5.9	1.8	0.5	0.1	0.3	45	87	4	12	1	0.08
BC	5.3				0.1	0.1	2.4	1.1	0.3	0.1	0.2	66	96	1	4	0	0.05
Bcj	5.3						2.6	1.2	0.3	0.1	0.2	71	95	7	4	1	0.05
Cl	5.5						2.5	1.6	0.7	0.1	0.2	100+	94	4	5	1	0.05
Cc	5.5						3.1	1.8	0.8	0.0	0.3	95	92	5	7	1	0.05
C2	5.4						4.7	2.6	1.3	0.1	0.4	92	87	4	9	4	0.05

BELLHOUSE SOIL

Location: Saturna Island, southeast of T.V. tower on Mount Warburton Pike
Landform: colluvial veneer overlying sandstone bedrock
Topography: very strong slopes (44%), upper slope position, smooth microtopography
Parent materials: channery sandy loam colluvial materials over sandstone bedrock
Present land use: natural grasses with scattered coast Douglas fir
Remarks: profile is typical for Bellhouse soil, although deeper than generally found in survey area

Longitude: 123°10'15"W
Latitude: 48°46'35"N
Elevation: 475 m
Drainage: well
Perviousness: moderately
Effective rooting depth: 60 cm
Classification: Orthic Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse frag. (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0–15	black (7.5 YR 2/0)	very dark gray (10 YR 3/1)	sandy loam	strong	fine to medium	granular	soft	very friable	none	2
AB	15–33	black (10 YR 2/1)	very dark grayish brown (10YR 3/2)	channery sandy loam	weak to moderate	fine to medium	angular blocky	slightly hard	very friable	none	25
Bm	33–59	very dark grayish brown (10YR 3/2)	dark yellowish brown (10YR 4/4)	sandy loam	weak	medium to coarse	angular blocky	slightly hard	very friable	none	15
C	59–82	dark yellowish brown (10YR 4/4)	yellowish brown (10YR 5/6)	channery sandy loam	weak	medium to coarse	angular blocky	slightly hard	very friable	none	43
R	82+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	5.3	4.6	0.29	16	0.1	0.1	26.2	12.3	4.4	0.7	0.1	67	62	3	28	9	0.15
AB	5.2	2.2	0.18	12	0.2	0.2	21.6	8.4	3.3	0.5	0.1	57	66		26	8	0.17
Bm	4.9	1.1	0.09	12	0.1	0.2	16.4	6.1	1.9	0.2	0.2	51	67		25	8	0.21
C	4.3	0.9	0.08	11	0.1	0.2	19.6	7.8	2.2	0.1	0.4	54	62		30	8	0.26

BRIGANTINE SOIL

Location: Morgan Road Dyer's farm, Galiano Island
Landform: blanket of marine deposits overlying subdued terrain
Topography: gentle slope (7%), moderately mounded microtopography
Parent materials: shallow sandy loam marine deposits overlying deep loam marine deposits
Present land use: forested; dominated by western red cedar and coast Douglas fir
Remarks: subsoil is usually finer textured

Longitude: 123°21'50"W
Latitude: 48°52'45"N
Elevation: 130 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 67 cm
Classification: Gleyed Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	moist	wet		
Ah	0-9	very dark brown (10YR 2/2)	dark brown (10YR 4/3)	sandy loam	weak	medium to coarse	granular	friable	nonsticky	none	<10
Bm1	9-31	dark brown (7.5YR 3/4)	yellowish brown (10YR 5/4)	sandy loam	weak	fine to medium	subangular blocky	very friable	slightly sticky	none	<10
Bm2	31-58	strong brown (7.5YR 4/6)	yellowish brown (10YR 5/4)	sandy loam	weak to moderate	fine to medium	subangular blocky	very friable	slightly sticky	none	<10
Bm3	58-67	dark yellowish brown (10YR 4/6)	yellowish brown (10YR 5/4)	sandy loam	moderate	fine to medium	subangular blocky	friable	slightly sticky	none	<10
IIBg1	67-76	olive (2.5Y 5/4)	pale yellow (2.5Y 7/4)	loam	moderate	medium to coarse	subangular blocky	friable	sticky	com.,fine,prom. strong brown (7.5YR 4/6)	<5
IIBg2	76-96	olive (2.5Y 4/4)	very pale brown (10YR 7/4)	loam	moderate to strong	coarse	angular blocky	firm	sticky	many,medium,prom. strong brown (7.5YR 4/6)	<5
IICBg	96-115	olive (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	loam	moderate to strong	coarse	angular blocky	firm	sticky	few,fine,prom. strong brown (7.5YR 5/6)	<5

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	4.9	4.6	0.21	22	0.3	0.3	21.2	6.8	1.2	0.7	0.1	42	59	13	30	12	0.22
Bm1	4.9	1.2	0.06	20	0.3	0.3	10.1	2.4	0.7	0.3	0.1	35	65	10	25	10	0.26
Bm2	4.8	0.9	0.06	15	0.3	0.3	9.8	2.3	0.7	0.2	0.1	34	63		26	11	0.23
Bm3	4.7	0.9	0.05	18	0.3	0.2	10.4	2.5	0.8	0.2	0.1	34	62		27	11	0.24
IIBg1	4.7	0.5	0.03	17	0.1	0.1	12.1	5.2	1.6	0.1	0.2	58	45		44	11	0.38
IIBg2	5.0	0.4	0.02	20			14.3	9.0	2.5	0.1	0.2	82	44		47	9	0.43
IICBg	5.9						15.0	10.6	2.7	0.1	0.3	91	45		44	10	0.40

COWICHAN SOIL

Location: field behind old Mission School, Kuper Island
Landform: blanket of marine deposits; drumlinized, rolling terrain
Topography: very gentle slopes (2-5%), smooth microtopography
Parent materials: silty clay marine deposits
Present land use: pasture
Remarks: typical Cowichan soil profile

Longitude: 123°39'10"W
Latitude: 48°58'25"N
Elevation: 10 m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 24 cm
Classification: Humic Luvic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	moist	wet		
Ap	0–24	dark brown (7.5YR 3/2)	brown (10YR 5/3)	silt loam	strong	coarse	granular	friable	nonsticky	none	0
Aeg1	24–33	gray, light gray (5Y 6/1)	light gray (10YR 7/2)	silt loam	moderate to strong	medium	subangular blocky	friable	slightly sticky	many, fine, prom. yellowish brown (10YR 5/6)	2
Aeg2	33–40	gray, light gray (5Y 6/1)	white (10YR 8/1)	silt loam to loam	moderate to strong	medium to coarse	subangular blocky	firm	sticky	com., fine, prom. yellowish brown (10YR 5/6)	5
Btg1	40–53	gray (5Y 5/1)	pale brown (10YR 6/3)	silty clay	moderate	coarse	angular blocky	firm	sticky	many, medium, prom. yellowish brown (10YR 5/6)	0
Btg2	53–70	gray (5Y 5/1)	pale brown (10YR 6/3)	silty clay			massive	firm	sticky	many, medium, prom. strong brown (7.5YR 5/6)	0
BCg	70–90+	olive gray (5Y 4/2)	light gray (2.5Y 7/2)	silty clay	weak	fine	pseudo-platy	firm	sticky	none	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat. (%)	Particle size distribution				Soil erosion (K value)
					Fe (%)	Al (%)	Fe (%)	Al (%)	CEC	Ca	Mg	K	Na		Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	
									(meq/100 g soil)										
Ap	4.9	3.3	0.24	14	0.4	0.3	0.9	0.4	21.4	5.5	2.1	0.6	0.1	39	17	7	58	25	0.33
Aeg1	4.8	0.5	0.03	17	0.2	0.1	0.5	0.2	8.1	2.7	1.5	0.1	0.1	55	22	11	60	19	0.58
Aeg2	4.8	0.5	0.04	13	0.2	0.1	0.4	0.2	8.3	2.8	1.8	0.1	0.1	58	29		51	19	0.46
Btg1	5.0				0.1	0.1	0.8	0.3	26.5	10.0	9.9	0.2	0.3	76	6		43	50	0.27
Btg2	5.4				0.1	0.1	0.5	0.2	30.3	14.2	13.6	0.2	0.4	93	5		46	48	0.29
BCg	5.8				0.1	0.1	0.5	0.3	29.9	15.1	13.8	0.2	0.4	100+	1		48	51	0.31

CROFTON SOIL

Location: end of Horton Bay Road to south in little depression, Mayne Island
Landform: fluvial blanket, depression
Topography: very gentle slopes (2%), slightly mounded microtopography
Parent materials: variable-textured fluvial deposits
Present land use: permanent pasture dominated by horsetail and rushes
Remarks: textures much coarser than typical Crofton soil; no B horizon present; generally classified as Orthic Humic Gleysol

Longitude: 123°14'30"W
Latitude: 48°49'20"N
Elevation: 10 m
Drainage: very poorly
Perviousness: moderate
Effective rooting depth: 30 cm
Classification: Rego Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	moist	wet		
Ap1	0-6	very dark grayish brown (10YR 3/2)	dark grayish brown (10YR 4/2)	loam to clay loam			massive	friable	nonsticky	none	7
Ap2	6-30	very dark brown (10YR 2/2)	dark grayish brown (10YR 4/2)	gravelly sandy loam			massive	friable	slightly sticky	none	26
Ah	30-44	black (10YR 2/1)	dark grayish brown (10YR 4/2)	gravelly sandy loam	moderate	coarse	subangular blocky	firm	sticky	com., fine, prom. yellowish red (5YR 4/6)	26
Cg	44-125	olive gray (5Y 4/2)	light brownish gray (10YR 6/2)	very gravelly sandy loam			single grain	loose	nonsticky	none	51

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Cation exchange					Base sat.	Particle size distribution				Soil erosion
					CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ap1	5.1	11.0	0.80	14	42.3	14.8	4.8	0.7	1.2	51	36	12	38	27	0.24
Ap2	5.0	3.0	0.22	14	18.5	6.8	2.1	0.1	0.3	50	60	7	27	13	0.19
Ah	4.8	2.9	0.22	13	19.1	6.2	2.0	0.1	0.3	45	61		23	16	0.15
Cg	4.8	0.5	0.04	13	10.3	3.9	1.8	0.1	0.3	58	71		23	6	0.15

FAIRBRIDGE SOIL

Location: east side of old tidal flat area on slope, Thetis Is.
Landform: blanket of marine deposits
Topography: moderately sloping (12%), southwest facing, moderately mounded microtopography
Parent materials: deep marine silt over clay deposits
Present land use: forested; dominant coast Douglas fir and red alder;
salal, western bracken, western sword fern
Remarks: This profile is representative of the "wetter" sites where Fairbridge soils occur;
generally classified as Gleyed Eluviated Dystric Brunisol

Longitude: 123°40'00"W
Latitude: 48°59'45"N
Elevation: 12 m
Drainage: imperfectly
Perviousness: moderately
Effective rooting depth: 125 cm
Classification: Gleyed Brunisolic
Gray Luvisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	moist	wet		
L-F-H	4-0										
Bm1	0-20	dark brown (10YR 4/3) brown (10YR 4/3) to dark yellowish brown (10YR 4/4)	very pale brown (10YR 7/4)	silt loam	weak to moderate	medium	subangular blocky	friable	sticky plastic	none	10
Bm2	20-29	yellowish brown (10YR 5/4)	pale brown (10YR 6/3)	silt loam	moderate	medium to coarse	subangular blocky	friable	sticky plastic	few,fine,dist. strong brown (7.5YR 4/6)	5
IIAegj	29-37	light yellowish brown (2.5Y 6/4)	very pale brown (10YR 7/3)	silty clay	moderate to strong	coarse	angular blocky	friable	sticky plastic	man.med.prom. strong brown (7.5YR 5/8)	<5
IIBtg	37-65	light gray (5Y 7/2) and light olive gray (F6 6/2)	white (2.5Y 8/2)	silty clay	weak	coarse to very coarse	subangular blocky	friable	sticky plastic	man.med.prom. strong brown (7.5YR 5/8)	0
IICBg	65-80	gray (5Y 5/1)	light gray (5Y 7/2)	silty clay loam	moderate	medium	angular blocky	friable	sticky plastic	com.fine.prom. brownish yellow (10YR 6/8)	0
IICg1	80-125	gray (5Y 5/1)	olive (5Y 5/4)	silty clay	strong	coarse	angular blocky	firm	sticky plastic	no mottles, manganese staining	0
IICg2	125+	gray (5Y 5/1)	olive (5Y 5/4)	silty clay	weak	medium	pseudo platy	firm	sticky plastic		

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos. Fe (%)	Pyrophos. Al (%)	Cation exchange CEC	Ca	Mg	K	Na	Base sat. (%)	Particle size distribution Total sand (%)	Very fine sand (%)	Silt (%)	Clay (%)	Soil erosion (K value)
							(meq/100 g soil)										
L-F-H	5.1	29.6	0.78	38													
BM1	4.3	2.3	0.08	29	0.3	0.3	16.0	2.1	1.1	0.5	0.1	24	21	3	60	19	0.38
Bm2	5.1	1.3	0.08	16	0.3	0.2	16.0	6.4	2.3	0.3	0.1	57	24	4	54	22	0.43
IIAegj	5.0	0.6	0.11	5	0.2	0.2	19.3	8.6	4.1	0.2	0.2	68	9	2	50	41	0.34
IIBtg	5.1	0.7	0.05	14	0.1	0.1	30.8	15.6	9.3	0.3	0.3	83	3	1	46	51	0.27
IICBg	5.3	0.5					32.7	18.4	10.5	0.2	0.4	90	6	2	56	38	0.40
IICg1	5.7	0.4					32.4	20.3	10.7	0.2	0.4	98	6	1	52	42	0.35
IICg2	6.0	0.4					29.7	18.5	9.6	0.2	0.4	97	5	1	55	40	0.37

GALIANO SOIL

Location: Yardarm Road, Magic Lake Estates, North Pender Island
Landform: colluvial veneer overlying shale bedrock
Topography: strongly sloping (25%) with a northerly aspect
Parent materials: shallow very shaly silt loam colluvial materials overlying shale bedrock
Present land use: residential subdivision
Remarks: Bfj horizon is normally a Bm horizon; it meets all physical requirements of Bf horizon but not morphologically (color)

Longitude: 123°18'7"W
Latitude: 48°46'30"N
Elevation: 85 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 40 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0-9	very dark brown (10YR 2/2)	dark grayish brown (10YR 4/2)	very shaly silt loam	weak	fine	granular	soft	very friable	none	65
Bfj	9-40	very dark grayish brown (10YR 3/2)	dark brown (10YR 4/3)	very shaly silt loam	moderate	coarse	angular blocky	slightly hard	friable	none	65
C	40-55	dark brown (10YR 4/3)	brown (10YR 5/3)	very shaly silt loam	strong	coarse	angular blocky	hard	firm	none	85
R	55+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	4.9	7.1	0.34	21			23.2	16.5	2.4	1.1	0.2	87	33	7	54	14	0.30
Bfj	4.8	2.0	0.12	17	0.4	0.4	11.3	8.8	1.9	0.5	0.3	100+	30	7	56	14	0.33
C	4.7	1.5	0.10	15			19.5	10.8	2.5	0.7	0.3	73	25		61	14	0.34

METCHOSIN SOIL

Location: Henshaw Farm, South Pender Island
Landform: fen
Topography: level, 1% slope with smooth microtopography
Parent materials: peat (organic deposits) of sedges and reeds with <10% woody materials
Present land use: pasture with grasses, sedges, and rushes
Remarks: water table at 105 cm (82/09/23)

Longitude: 123°13'00"W
Latitude: 48°44'56"N
Elevation: 70 m
Drainage: very poorly
Perviousness: moderately
Effective rooting depth: 35 cm
Classification: Typic Humisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Von post scale	Rubbed fibre (%)	Mottles	Coarse fragm. (%)
		moist	dry					
Op	0-20	black (10YR 2/1)	black (10YR 2/1)	humic	06	2	none	0
Oh1	20-27	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	08	2	none	0
Oh2	27-35	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	07	2	none	0
Oh3	35-40	very dark brown (10YR 2/2)	black (10YR 2/1)	humic	08	2	none	0
Oh4	40-80	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	08	4	none	0
Oh5	80-160	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	09	2	none	0
Oh6	160-200+	black (10YR 2/1)	very dark brown (10YR 2/2)	humic	10	4	none	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Cation exchange					Base sat. (%)	Pyrophosphate index
					CEC	Ca	Mg	K	Na		
					(meq/100 g soil)						
Op	5.2	49.2	1.93	25	192.3	103.1	21.7	0.2	4.9	68	|
OH1	4.9	51.9	1.85	28	217.9	106.5	25.3	0.1	5.2	63	|
Oh2	5.0	51.5	2.18	24	184.0	83.0	19.5	0.1	5.2	59	|
Oh3	5.0	51.9	2.27	23	197.2	90.4	24.2	0.1	5.6	61	|
Oh4	5.1	52.6	1.48	36	208.1	95.7	29.6	0.1	7.6	64	|
Oh5	5.1	51.8	1.61	32	196.5	93.8	29.1	0.1	8.4	67	|
Oh6	5.3	52.5	1.63	32	177.9	85.9	30.7	0.1	8.4	70	|

MEXICANA SOIL

Location: Saltspring Island - northside of Bullock Lake
Landform: morainic blanket - rolling to hilly landscape
Topography: strong to very strong slopes (21-31%) micromounded topography
Parent materials: gravelly sandy loam to gravelly loam morainic deposits <100 cm deep over compact, unweathered till
Present land use: forested; second-growth coast Douglas fir with predominantly salal ground cover
Remarks: Mexicana soil generally classified as Orthic Dystric Brunisol; only a few Mexicana soils have a well-developed Bt horizon, mottling noticeable only when the soil is dry

Longitude: 123°30'25"W
Latitude: 48°52'30"N
Elevation: 90 m
Drainage: moderately well
Perviousness: moderately
Effective rooting depth: 30 cm
Classification: Brunisolic Gray Luvisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
LF	3-0										
Ah	0-4	very dark grayish brown (10YR 5/3)	brown (10YR 3/2)	sandy loam	strong	coarse	granular	soft	friable	none	15
Bm	4-23	dark yellowish brown (10YR 4/4)	light yellowish brown (10YR 6/4)	sandy loam	moderate	medium	subangulur blocky	slightly hard	friable	none	25
AB	23-50	brown to dark brown (10YR 4/3)	yellowish brown (10YR 5/4)	sandy loam			massive	hard	firm	few, fine, faint, yellowh brown (10YR 5/6)	5
Bt	50-95	dark yellowish brown (10YR 4/4)	yellowish brown (10YR 5/4)	loam			massive	hard	very firm	common, medium, faint brown to dark brown (7.5YR 4/4)	10
BC	95-130	dark yellowish brown (10YR 4/4)	yellowish brown (10YR 5/4)	loam			massive	hard	firm	few, medium, faint strong brown (7.5YR 5/6)	15
R	130+			sandstone bedrock							

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	5.4	4.7	0.17	28	0.2	0.2	19.1	9.8	1.6	0.8	0.1	64	58	18	32	10	0.26
Bm	5.0	1.0	0.05	20	0.2	0.2	9.9	3.9	0.8	0.5	0.1	53	59	19	30	11	0.37
AB	4.9	0.5	0.03	17	0.1	0.1	9.4	4.1	1.3	0.3	0.1	62	58	17	29	13	0.39
Bt	5.1	0.4	0.03	13			12.4	5.3	2.7	0.1	0.2	67	53	18	26	21	0.35
BC	4.9	0.5	0.02	25			11.7	5.0	2.4	0.1	0.2	66	51	12	35	14	0.36

PARKSVILLE SOIL

Location: east of "hairpin turn" Bedwell Harbour Road, North Pender Island
Landform: blanket of marine deposits overlying level terrain
Topography: level (2% slope), with smooth microtopography
Parent materials: sandy loam marine deposits overlying silty clay loam marine deposits
Present land use: pasture, rushes, and grasses
Remarks: sand lens present in IIBCg, Ap horizon much finer textured than typical Parksville soil

Longitude: 123°16'31"W
Latitude: 48°47'5"N
Elevation: 50 m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 20 cm
Classification: Orthic Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
Ap	0-20	very dark brown (10YR 2/2)	dark brown (10YR 3/3)	clay loam	strong	coarse	angular blocky	hard	friable	none	<5
Bg	20-50	olive brown (2.5Y 4/4)	pale brown (10YR 6/3)	sandy loam	moderate	very coarse	angular blocky	slightly hard	very friable	com., fine, prom. dark yellowish brown (10YR 4/6)	<5
BCg	50-70	grayish brown (2.5Y 5/2)	light yellowish brown (2.5Y 6/4)	loam	strong	very coarse	angular blocky	hard	very friable	com., medium, prom. strong brown (7.5YR 5/6)	<5
IICg	70-100+	olive brown (5Y 5/2)	light browish gray (2.5Y 6.5/2)	silty clay loam			massive	very hard	firm	com., fine, prom. yellowish brown (10YR 5/6)	<5

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Oxalate		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ap	5.3	3.9	0.29	13	1.0	0.5	32.2	18.4	4.1	0.4	0.2	70	36	8	36	28	0.28
Bg	5.3	0.3	0.03	10	0.3	0.2	11.4	7.7	2.3	0.1	0.1	89	61		30	10	0.32
BCg	5.6	0.3	0.03	10	0.4	0.2	18.5	12.7	4.2	0.1	0.2	93	50		32	18	0.30
IICg	5.9	0.2	0.02	10	0.5	0.3	25.1	18.3	6.7	0.2	0.3	100+	12		55	33	0.42

QUALICUM SOIL

Location: southwest of Ganges on north side of Fulford-Ganges Road, Saltspring Island
Landform: glaciofluvial blanket
Topography: strongly sloping (20%), moderately mounded microtopography
Parent materials: gravelly sandy to gravelly sandy loam glaciofluvial deposits
Present land use: forested; bigleaf maple, red alder, western red cedar, and western sword fern
Remarks: typical Qualicum profile, vegetation not typical

Longitude: 123°29'14"W
Latitude: 48°50'16"N
Elevation: 100 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 45 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
Lf	3-0										
Ah	0-9	very dark grayish brown (10YR 3/2)	dark brown (10YR 3/3)	very gravelly sandy loam	moderate	medium	granular	loose	friable	none	56
Bm1	9-45	olive brown (2.5Y 4/4)	yellowish brown (10YR 5/4)	gravelly loamy sand	very weak	medium	subangular blocky	soft	very friable	none	30
Bm2	45-65	olive brown (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	gravelly sand	moderate	medium	subangular blocky	slightly hard	friable	none	29
BC	65-100+	light olive brown (2.5Y 5/4)	pale yellow (2.5Y 7/4)	gravelly sandy loam	very weak	medium	angular blocky	slightly hard	friable	none	43

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat.	Particle size distribution			Soil erosion
					Fe	Al	Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(K value)
Ah	5.3	10.9	0.45	24	0.2	0.2			35.4	16.2	2.3	0.4	0.1	53	75	19	6	0.05
Bm1	5.3	1.0	0.05	20	0.2	0.3	0.5	0.6	8.4	2.5	0.3	0.1	0.0	35	83	15	2	0.11
Bm2	5.6	0.3	0.02	15	0.0	0.1	0.3	0.4	3.6	1.0	0.1	0.1	0.0	33	88	10	2	0.09
BC	5.0								4.8	1.3	0.2	0.1	0.0	35	72	23	5	0.20

SALALAKIM SOIL

Location: Gowlland Point Road, South Pender Island
Landform: colluvial blanket, ridged terrain
Topography: extremely sloping (65%), with southerly aspect, slightly mounded microtopography
Parent materials: gravelly loam colluvial materials over conglomerate bedrock
Present land use: forested; coast Douglas fir, Pacific madrone, grasses, and common gorse
Remarks: profile deeper (>100 cm) and finer textured than Salalakim soil

Longitude: 123°12'43"W
Latitude: 48°44'26"N
Elevation: 55 m
Drainage: well
Perviousness: moderately
Effective rooting depth: 78 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
Ah	0-4	dark brown (7.5YR 3/2)	dark brown (7.5YR 4/2)	gravelly loam	moderate to strong	fine	granular	hard	friable	none	35
Bm1	4-33	dark brown (7.5YR 3/2)	dark brown (7.5YR 4/2)	gravelly loam to sandy loam	moderate	very fine	subangular blocky	hard	friable	none	35
Bm2	33-78	dark brown (7.5YR 4/2)	dark brown (7.5YR 4/2)	gravelly loam to sandy loam	moderate	very fine	subangular blocky	hard	friable	none	40
BC	78-120	dark brown (7.5YR 3/2)	brown (7.5YR 5/2)	gravelly loam to sandy loam	weak to moderate	fine	subangular blocky	hard	friable	none	30

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand(%)	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)		(%)	(%)	(K value)
Ah	5.9	3.9	0.27	14	0.1	0.0	23.2	12.8	6.1	1.2	0.1	83	47	13	37	16	0.24
Bm1	5.3	1.0	0.06	17	0.1	0.1	21.6	10.5	6.7	0.4	0.1	82	52	14	33	15	0.39
Bm2	5.5	1.9	0.09	21	0.1	0.1	21.9	11.4	4.4	0.1	0.1	75	52		35	13	0.20
BC	5.7	1.0	0.06	17	0.1	0.1	17.8	10.7	4.0	0.1	0.1	86	51		38	11	0.30

SATURNA SOIL

Location: south arm of Hess Road, 100 m before dead end, 10 m east in trees, Gabriola Island
Landform: colluvial veneer over sandstone bedrock, rolling landscape
Topography: moderate to strong slopes (15%) southerly aspect, slightly mounded microtopography
Parent materials: sandy loam colluvial materials over sandstone bedrock
Present land use: forested, coast Douglas fir and salal
Remarks: Ah deeper and textures finer than typical Saturna soil; generally classified as Orthic Dystric Brunisol

Longitude: 123°47'30"W
Latitude: 49°09'20"N
Elevation: 140 m
Drainage: well
Perviousness: rapidly
Effective rooting depth: 60 cm
Classification: Orthic Sombric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
LF	3-0										
Ah	0-11	very dark grayish brown(10YR 3/2)	brown to dark brown(7.5YR 4/2)	channery loam	strong	coarse	granular	slightly hard	friable	none	20
Bm1	11-30	brown,dark brown (10YR 4/3)	dark brown (7.5YR 3/2)	channery loam to sandy loam	strong	medium	angular blocky	slightly hard	friable	none	25
Bm2	30-50	brown,dark brown (10YR 4/3)	brown, dark brown(7.5YR 4/4)	very channery sandy loam	moderate	medium	angular blocky	slightly hard	friable	none	60
BC	50-80	yellowish brown (10YR 5/4)	brown, dark brown(7.5YR 4/4)	very channery sandy loam	weak	very fine	angular blocky	slightly hard	friable	none	90
R	80+										

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand(%)	Silt	Clay	
		(%)	(%)		(%)	(%)	(%)	(%)	(meq/100 g soil)					(%)	(%)		(%)	(%)	(K value)
LF	4.9	36.2	1.30	28	0.0	0.1	0.2	0.2	88.8	32.7	7.8	3.4	0.4	50					
Ah	4.7	7.1	0.37	19	0.2	0.2	0.4	0.3	32.0	11.5	2.7	0.6	0.1	47	48	10	42	10	0.24
Bm1	4.9	1.5	0.09	17	0.2	0.2	0.4	0.3	19.0	7.0	1.7	0.5	0.1	49	52	11	38	10	0.30
Bm2	4.8	1.3	0.08	16	0.2	0.2	0.5	0.5	17.1	5.3	1.3	0.5	0.1	42	55		34	11	0.24
BC	4.8				0.1	0.1	0.5	0.3							53		40	7	0.28

SATURNA SOIL
(deep, nongravelly phase)

Location: in Ecolgical Reserve 15, northeast of old homestead, Saturna Island
Landform: colluvial veneers and blankets over sandstone bedrock, rolling landscape
Topography: strong slopes (10-30%), south aspect, slightly mounded microtopography
Parent materials: deep sandy loam colluvial and glacial drift materials over sandstone bedrock
Present land use: forested; coast Douglas fir with salal understory
Remarks: profile has a Bf horizon; generally classified as Orthic Dystric Brunisol

Longitude: 123°09°20"W
Latitude: 48°46'40"N
Elevation: 300 m
Drainage: moderately well
Perviousness: moderately
Effective rooting depth: 64 cm
Classification: Orthic Humo-Ferric Podzol

PROFILE DESCRIPTION

Horizon	Depth	Color		Texture	Structure			Consistence		Mottles	Coarse
	(cm)	moist	dry		grade	class	kind	dry	moist		Fragm. (%)
Ah	0–6	black (10YR 2/1)	very dark gray (10YR 3/1)	sandy loam	moderate to strong	medium	granular	soft	very friable	none	0
Bf	6–32	brown (7.5Y 4/2)	brown (7.5YR 4/4)	sandy loam	weak	fine to medium	subangular blocky	soft	very friable	none	4
Bm	32–64	yellowish brown (10YR 5/6)	light olive brown (2.5Y 5/4)	sandy loam	weak	fine to medium	subangular blocky	soft	very friable	none	5
BC	64–88	olive yellow (2.5Y 6/6)	pale yellow (2.5Y 7/4)	sandy loam	weak	medium to coarse	angular blocky	slightly hard	very friable	none	0
Cgj1	88–138	gray (5Y 6/1)	light gray (5Y 7/1)	sandy loam	weak	medium to coarse	angular blocky	slightly hard	friable	few, fine, dist. light olive brown (2.5Y 5/6)	0
Cgj2	138–150	light olive gray (5Y 6/2)	light gray (5Y 7/1)	sandy loam	weak to moderate	medium to coarse	angular blocky	slightly hard	friable	few, medium, dist. light olive brown (2.5Y 5/6)	0
Cg	170–190	light yellowish brown (2.5Y 6/4)	light gray (2.5Y 7/2)	sandy loam			massive	slightly hard	very friable	none	0

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand(%)	Silt	Clay	
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)		(%)	(%)	(K Value)
Ah	5.2	4.9	0.15	33	0.4	0.5	20.1	7.2	1.1	0.4	0.2	43	51	12	42	7	0.27
Bf	5.2	1.1	0.06	18	0.3	0.4	8.7	2.1	0.4	0.2	0.1	33	54		42	4	0.33
Bm	5.3	0.5	0.02	25	0.1	0.2	4.0	1.3	0.3	0.1	0.1	43	67		31	2	0.26
BC	5.5	0.3	0.02	15			2.7	0.8	0.1	0.1	0.1	38	65		33	2	0.26
Cgj1	5.6						4.4	2.2	0.7	0.1	0.2	71	63		34	4	0.26
Cgj2	5.6						4.3	1.9	0.6	0.1	0.1	63	65		31	4	0.27
Cg	5.4						4.1	1.9	0.7	0.1	0.2	68	67		28	4	0.22

ST. MARY SOIL

Location:	in treed area north of school house on North road, Thetis Island	**Longitude:**	123°40'33"W
Landform:	shallow marine deposits overlying till blanket; topography controlled by underlying sandstone and shale bedrock	**Latitude:**	48°59'6"N
Topography:	moderately sloping (13%), moderately mounded microtopography	**Elevation:**	14 m
Parent materials:	coarse marine veneer over shallow fine marine over coarse glacial till deposits	**Drainage:**	imperfect
Present land use:	forested; second-growth; dominantly western red cedar with coast Douglas fir, red alder, and bigleaf maple; understory of western sword fern and salal	**Perviousness:**	slow
Remarks:	thin clay films occur on peds of the IIBg horizon; root mat occurs along vertical cracks in the IIICg horizon; glacial till deeper than usual (deep phase)	**Effective rooting depth:**	50 cm
		Classification:	Gleyed Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse frag. (%)
		moist	dry		grade	class	kind	moist	wet		
L-F-H	3-0										
Bm1	0-35	strong brown (7.5YR 4/6)	yellowish brown (10YR 5/6)	gravelly sandy loam	moderate	medium	granular	very friable			30
Bm2	35-50	dark brown (7.5Y 3/4 to 4/4)	brownish yellow (10YR 6/6)	gravelly sandy loam	moderate	medium	granular	very friable			40
IIBG	50-65	light yellowish brown (2.5Y 6/4)	pale yellow (2.5Y 7/4)	loam	weak	coarse	subangular blocky	friable		com.fine,dist. brownish yellow (10YR 6/8)	15
IICg	65-110	olive (5Y 5/3)	light yellowish brown (2.5Y 6/4)	silty clay	moderate	coarse	angular blocky	firm		com.fine,prom. strong brown (7.5YR 5/6)	0
IIICg	110+	gray to light gray (5Y 6/1)	pale yellow (2.5Y 7/4)	gravelly sandy loam	moderate	medium	pseudo platy	firm		com.fine.prom. yellowish red (5YR 4/6)	30

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos. Fe	Pyrophos. Al	Cation exchange CEC	Ca	Mg	K	Na	Base sat.	Particle size distribution Total sand	Very fine sand	Silt	Clay	Soil erosion
		(%)	(%)		(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
L-F-H																	
BM1	4.8	1.2	0.08	15	0.3	0.2	13.8	4.4	1.0	0.2	0.1	41	58	7	33	9	0.17
Bm2	5.0	1.2	0.06	20	0.3	0.2	13.3	4.8	1.4	0.2	0.1	49	55	8	31	14	0.14
IIBg	4.8	0.5	0.03	17	0.1	0.1	9.9	5.0	1.6	0.1	0.1	69	46		42	12	0.27
IICg	4.9						28.8	15.3	5.8	0.2	0.3	75	4		53	43	0.29
IIICg	5.0						13.8	8.4	2.6	0.1	0.2	82	53		42	5	0.34

TOLMIE SOIL

Location: Port Washington Road, North Pender Island
Landform: marine blanket
Topography: nearly level (1%) slope
Parent materials: fine marine blanket, sandy marine horizons
Present land use: forested; red alder with salmonberry and western sword fern understory
Remarks: water table at 105 cm on 14 May 1982; Ae horizon not typical for Tolmie soil

Longitude: 123°17'55"W
Latitude: 48°48'29"N
Elevation: 30 m
Drainage: poorly
Perviousness: slowly
Effective rooting depth: 45 cm
Classification: Orthic Humic Gleysol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color		Texture	Structure			Consistence		Mottles	Coarse fragm. (%)
		moist	dry		grade	class	kind	dry	moist		
LF	1-0										
Ah	0-15	black (10YR 2/1)	grayish brown (10YR 5/2)	silty clay loam	strong	coarse	granular	slightly hard	friable	none	<5
Aegj	15-28	grayish brown (2.5Y 5/2)	light gray (10YR 7/1)	silt loam	weak to moderate	fine	platy	slightly hard	friable	few, faint	<5
IIBg	28-38	gray (5Y 5/1)	light gray (10YR 7/2)	loamy sand			single grain	loose	loose	many, fine, prom. yellowish brown (10YR 5/6)	<5
IIIBg	38-85	gray (5Y 5/1)	light brownish gray (2.5Y 6/2)	clay loam	weak to moderate	fine	angular blocky	hard	firm	many, fine, prom. yellowish brown (10YR 5/6)	<2
IIICg	85-105+	dark gray (5Y 4/1)	light brownish gray (2.5Y 6/2)	silty clay loam	moderate to strong	fine to medium	angular blocky	hard	firm	com., fine, prom. dark yellowish brown (10YR 4/6)	<2

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C	Total N	C:N ratio	Pyrophos.		Oxalate		Cation exchange					Base sat.	Particle size distribution				Soil erosion
					Fe	Al	Fe	Al	CEC	Ca	Mg	K	Na		Total sand	Very fine sand	Silt	Clay	
		(%)	(%)		(%)	(%)	(%)	(%)	(meq/100 g soil)					(%)	(%)	(%)	(%)	(%)	(K value)
Ah	4.1	7.4	0.75	10	0.2	0.2	0.3	0.2	33.5	10.6	2.4	0.1	0.3	38	16	6	51	33	0.27
Aegj	5.1	0.6	0.06	10	0.0	0.1	0.1	0.1	12.7	7.8	2.5	0.0	0.2	83	20		58	22	0.46
IIBg	5.1	0.2	0.02	10	0.0	0.0	0.1	0.0	4.7	3.2	1.0	0.0	0.1	91	76		21	4	0.21
IIIBg	6.3	0.2	0.02	10	0.1	0.01	0.2	0.1	26.4	19.1	8.7	0.2	0.3	100+	30		39	31	0.33
IIICg	6.5	0.4	0.02	20					27.4	20.2	8.5	0.2	0.3	100+	14		47	39	0.31

TRINCOMALI SOIL

Location: Kuper Island, 700 m from turnoff to village before bend in road heading towards farm at south end of island
Landform: marine veneer overlying glacial till blanket, rolling landscape
Topography: moderate slopes (12%), slightly mounded microtopography
Parent materials: shallow gravelly loamy sand marine deposits overlying gravelly sandy loam glacial till deposits
Present land use: forested; second-growth coast Douglas fir, western red cedar, with red alder, bigleaf maple, and Pacific madrone; ground cover of salal
Remarks: typical Trincomali profile, vegetation not typical

Longitude: 123°38'20"W
Latitude: 48°58'5"N
Elevation: 60 m
Drainage: imperfectly
Perviousness: slowly
Effective rooting depth: 60 cm
Classification: Orthic Dystric Brunisol

PROFILE DESCRIPTION

Horizon	Depth (cm)	Color moist	Color dry	Texture	Structure grade	Structure class	Structure kind	Consistence dry	Consistence moist	Mottles	Coarse fragm. (%)
LF	3-0										
Ah	0-4	dark brown (7.5YR 3/2)	dark brown (10YR 3/3)	gravelly loamy sand	weak	medium to coarse	granular	soft	very friable	none	50
Bf	4-12	reddish brown (5YR 4/3)	reddish brown (5YR 5/4)	gravelly loamy sand	weak	medium	subangular blocky	loose	very friable	none	40
Bm1	12-50	dark reddish brown (5YR 3/4)	brown (7.5YR 5/4)	gravelly loamy sand	weak	medium	subangular blocky	loose	very friable	none	40
Bm2	50-60	dark yellowish brown (10YR 4/4)	light yellowish brown (10YR 6/4)	gravelly loamy sand	weak	medium	subangular blocky	loose	very friable	none	30
IIBCgj	60-65	olive brown (2.5Y 4/4)	light yellowish brown (2.5Y 6/4)	sandy loam	moderate	coarse	subangular blocky	soft	very friable	few,coarse,faint yellowish brown (10YR 5/6)	15
IICg	65-80	grayish brown (2.5Y 5/2)	light gray (2.5Y 7/2)	gravelly sandy loam	weak	fine to medium	pseudo platy	very hard	extremely firm	many, coarse,dist. brown to dark brown (7.5YR 4/4)	30
IICcg	80-100	olive brown (2.5Y 4/4)	light brownish gray (2.5Y 6/2)	gravelly loamy sand	moderate to strong	fine	pseudo platy	extremely hard	extremely firm	common,medium,dist. brown to dark brown (7.5YR 4/4)	25

ANALYTICAL DATA

Horizon	pH in $CaCl_2$	Organic C (%)	Total N (%)	C:N ratio	Pyrophos. Fe (%)	Pyrophos. Al (%)	Oxalate Fe (%)	Oxalate Al (%)	Cation exchange CEC (meq/100 g soil)	Ca	Mg	K	Na	Base sat. (%)	Particle size distribution Total sand (%)	Very fine sand(%)	Silt (%)	Clay (%)	Soil erosion (K value)
LF	5.1	41.9	1.54	27															
Ah	4.8	6.2	0.25	25	0.3	0.5	0.7	0.7	24.5	6.3	1.1	0.6	0.1	33	71	7	24	5	0.20
Bf	4.8	1.9	0.09	21	0.2	0.4	0.8	0.9	11.4	2.0	0.3	0.2	0.0	22	75	7	21	4	0.22
Bm1	5.0	1.2	0.05	24	0.1	0.3	0.7	0.9	7.9	1.4	0.2	0.1	0.0	21	77	6	20	3	0.25
Bm2	5.0	0.6	0.04	15	0.1	0.2	0.6	0.9	6.2	0.8	0.1	0.0	0.0	15	82	7	16	2	0.17
IIBCgj	5.0				0.0	0.2	0.4	0.8	4.8	0.7	0.1	0.0	0.0	17	69	13	28	3	0.39
IICg	4.6				0.1	0.3	0.3	0.6	6.4	0.8	0.1	0.1	0.0	16	67	14	30	3	0.44

APPENDIX 2. SOIL MOISTURE DATA FOR THE SOIL PROFILES

Table 2.1 includes data on available water storage capacity (AWSC) and the Atterberg limits of the mineral soils for the same profiles as are given in Appendix 1.

AWSC represents the amount of water that can be extracted from the soil by plants or that is available for plant use. Quantitatively, it is determined by the arithmetic difference between percent water at field capacity (1/3 atm.) and permanent wilting point (15 atm.). AWSCs have been determined for about the top 50 cm of the soil.

The Atterberg limits (liquid limit and plastic limit) measure the effect of moisture on the consistence of the soil material. This engineering property of the soil varies with the amount of water present. Atterberg limits have been determined for the subsoil (BC and C) horizons. The plasticity index is the arithmetic difference between the liquid and plastic limits. Some soils are nonplastic (NP).

The methods for the determination of AWSC and Atterberg limits are described by McKeague (1978).

Table 2.1 Selected soil moisture data for the soil profiles

Soil	Horizon	Depth (cm)	AWSC (%)	Liquid limit (%)	Plastic limit (%)	Plasticity index (%)
Baynes	Ah	0-33	13	-	-	-
	Bgj	33-66	2	-	-	-
	BCg	66-135	-	NP*	NP	NP
	Cg	135-180	-	NP	NP	NP
Beddis	Ah	0-5	11	-	-	-
	Bm	5-15	6	-	-	-
	Bfj	15-40	4	-	-	-
	BC	40-70	1	-	-	-
	Bcj	70-110	4	-	-	-
	C1	110-120	3	NP	NP	NP
	Cc	120-145	4	NP	NP	NP
	C2	145-150+	4	NP	NP	NP
Bellhouse	Ah	0-15	7	-	-	-
	AB	15-33	5	-	-	-
	Bm	33-59	5	-	-	-
	C	59-82	-	NP	NP	NP
Brigantine	Ah	0-9	13	-	-	-
	Bm1	9-31	7	-	-	-
	Bm2	31-58	7	20	18	2
	IICBg	96-115	-	22	17	5

Table 2.1 Selected soil moisture data for the soil profiles (continued)

Soil	Horizon	Depth (cm)	AWSC (%)	Liquid limit (%)	Plastic limit (%)	Plasticity index (%)
Cowichan	Ap	0-24	22	-	-	-
	Aeg1	24-33	15	-	-	-
	Aeg2	32-40	7	-	-	-
	Btg1	40-53	16	-	-	-
	BCg	70-90	-	51	25	26
Crofton	Ap1	0-6	18	-	-	-
	Ap2	6-30	6	-	-	-
	Ah	30-44	5	-	-	-
	Cg	44-125	3	NP	NP	NP
Fairbridge	Bm1	0-20	19	-	-	-
	Bm2	20-29	14	-	-	-
	IIAegj	29-37	16	-	-	-
	IIBtg	37-65	14	-	-	-
	IICBg	65-80	14	-	-	-
	IICg1	80-125	13	48	29	19
	IICg2	125+	13	44	25	19
Galiano	Ah	0-9	21	-	-	-
	Bm	9-40	19	-	-	-
	C	40-55	17	33	28	5
Mexicana	Ah	0-4	13	-	-	-
	Bm	4-23	11	-	-	-
	AB	23-50	8	-	-	-
	Bt	50-95	-	23	18	5
	BC	95-130	-	19	18	1
Parksville	Ap	0-20	13	-	-	-
	Bg	20-50	11	-	-	-
	IICg	70-100	-	42	22	20
Qualicum	Ah	0-9	12	-	-	-
	Bm1	9-45	4	-	-	-
	BC	65-100	-	NP	NP	NP
Salalakim	Ah	0-4	15	-	-	-
	Bm1	4-33	9	-	-	-
	Bm2	33-78	12	27	22	5
	BC	78-120	-	23	20	3
Saturna	Ah	0-11	10	-	-	-
	Bm1	11-30	8	-	-	-
	Bm2	30-50	6	-	-	-
	CB	50-80	-	NP	NP	NP

Table 2.1 Selected soil moisture data for the soil profiles (concluded)

Soil	Horizon	Depth (cm)	AWSC (%)	Liquid limit (%)	Plastic limit (%)	Plasticity index (%)
Saturna (deep, non-gravelly phase)	Ah	0-6	9	-	-	-
	Bf	6-32	6	-	-	-
	Bm	32-64	4	-	-	-
	Cgjl	88-138	-	NP	NP	NP
St. Mary	Bm1	0-35	11	-	-	-
	Bm2	35-50	12	-	-	-
	IIBC	50-65	12	-	-	-
	IICg	65-110	13	45	25	20
	IIICg	110+	11	NP	NP	NP
Tolmie	Ah	0-15	62	-	-	-
	Aegj	15-28	51	-	-	-
	IIBg	28-38	9	-	-	-
	IIICg1	85-105	-	46	21	25
	IIICg2	at 225	-	51	25	26
Trincomali	Ah	0-4	15	-	-	-
	Bf	4-12	8	-	-	-
	Bm1	12-50	10	-	-	-
	IICg	65-80	-	NP	NP	NP
	IICcg	80-100	-	NP	NP	NP

*Nonplastic.

MAPS
NOT
FILMED

CARTES
OMISES